EA-87-02

Ontario

ENVIRONMENTAL ASSESSMENT BOARD

VOLUME: 344

DATE: Wednesday, January 22, 1992

BEFORE:

A. KOVEN Chairman

E. MARTEL Member

FOR HEARING UPDATES CALL (COLLECT CALLS ACCEPTED) (416)963-1249

FARR & ASSOCIATES REPORTING INC.

(416) **482-3277**

2300 Yonge St., Suite 709, Toronto, Canada M4P 1E4

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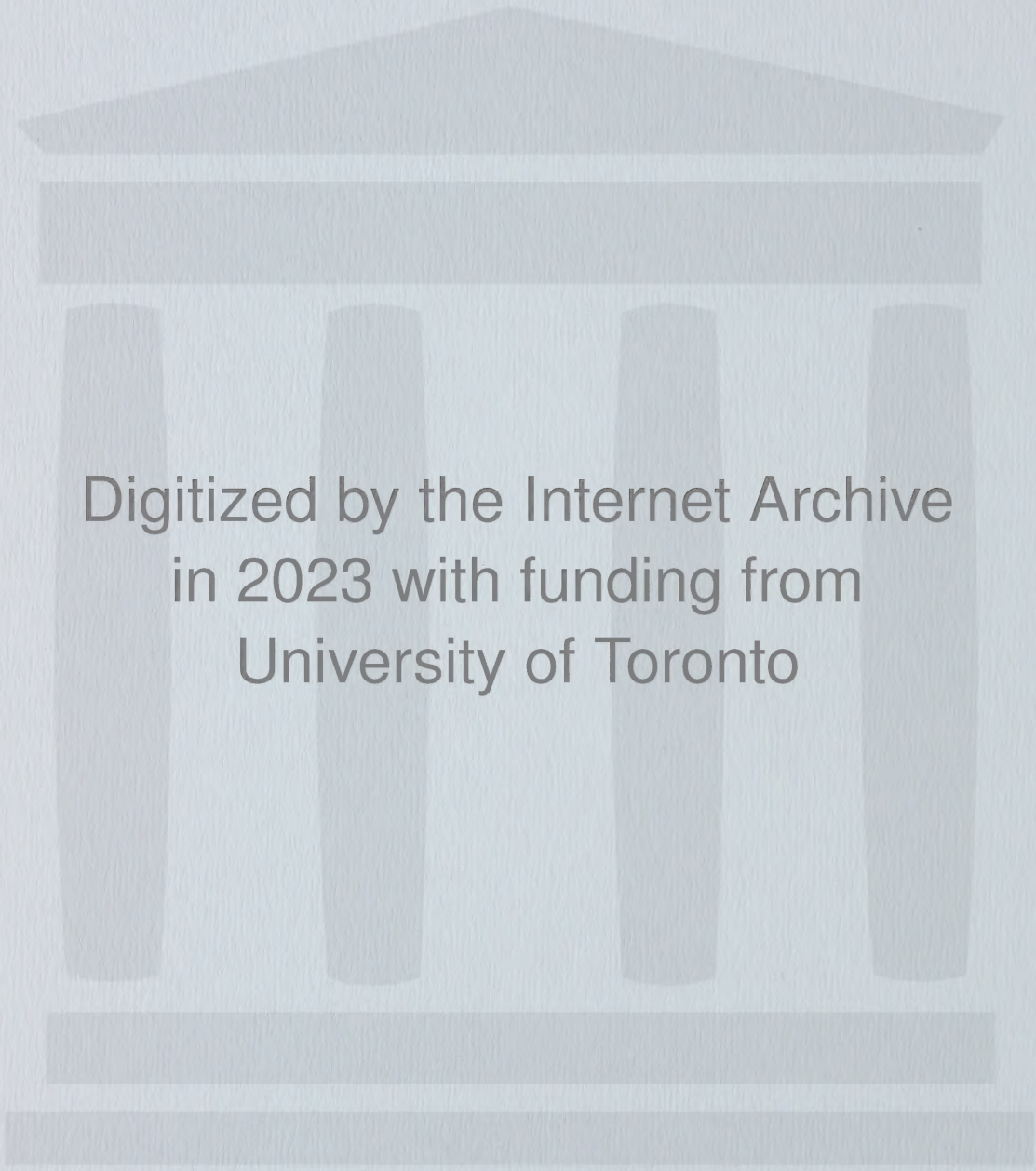

EA-87-02

HEARING ON THE PROPOSAL BY THE MINISTRY OF NATURAL RESOURCES FOR A CLASS ENVIRONMENTAL ASSESSMENT FOR TIMBER MANAGEMENT ON CROWN LANDS IN ONTARIO

IN THE MATTER of the Environmental Assessment Act, R.S.O. 1980, c.140;

- and -

IN THE MATTER of the Class Environmental Assessment for Timber Management on Crown Lands in Ontario;

- and -

IN THE MATTER of a Notice by The Honourable Jim Bradley, Minister of the Environment, requiring the Environmental Assessment Board to hold a hearing with respect to a Class Environmental Assessment (No. NR-AA-30) of an undertaking by the Ministry of Natural Resources for the activity of Timber Management on Crown Lands in Ontario.

Hearing held at the offices of the Ontario Highway Transport Board, Britannica Building, 151 Bloor Street West, 10th Floor, Toronto, Ontario, on Wednesday, January 22nd, 1992, commencing at 9:00 a.m.

VOLUME 344

BEFORE:

MRS. ANNE KOVEN	Chairman
MR. ELIE MARTEL	Member

A P P E A R A N C E S

MR. V. FREIDIN, Q.C. MS. C. BLASTORAH MS. K. MURPHY	MINISTRY OF NATURAL RESOURCES
MR. B. CAMPBELL MS. J. SEABORN MS. N. GILLESPIE	MINISTRY OF ENVIRONMENT
MR. R. TUER, Q.C. MR. R. COSMAN MS. E. CRONK MR. P.R. CASSIDY MR. D. HUNT	ONTARIO FOREST INDUSTRY ASSOCIATION and ONTARIO LUMBER MANUFACTURERS' ASSOCIATION
MR. R. BERAM	ENVIRONMENTAL ASSESSMENT BOARD
MR. J.E. HANNA DR. T. QUINNEY MR. D. O'LEARY	ONTARIO FEDERATION OF ANGLERS & HUNTERS
MR. D. HUNTER MR. M. BAEDER	NISHNAWBE-ASKI NATION and WINDIGO TRIBAL COUNCIL
MS. M. SWENARCHUK MR. R. LINDGREN	FORESTS FOR TOMORROW
MR. D. COLBORNE MR. G. KAKEWAY	GRAND COUNCIL TREATY #3
MR. J. IRWIN	ONTARIO METIS & ABORIGINAL ASSOCIATION
MR. J. ANTLER	NORTHERN ONTARIO TOURIST OUTFITTERS ASSOCIATION
MS. M. HALL	KIMBERLY-CLARK OF CANADA LIMITED and SPRUCE FALLS POWER & PAPER COMPANY

APPEARANCES (Cont'd):

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MR. Y. GERVAIS) MR. R. BARNES)	ONTARIO TRAPPERS ASSOCIATION
MR. L. GREENSPOON) MS. B. LLOYD)	NORTHWATCH
MR. J.W. ERICKSON, Q.C.) MR. B. BABCOCK)	RED LAKE-EAR FALLS JOINT MUNICIPAL COMMITTEE
MR. D. SCOTT) MR. J.S. TAYLOR)	NORTHWESTERN ONTARIO ASSOCIATED CHAMBERS OF COMMERCE
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MR. S.M. MAKUCH	CANADIAN PACIFIC FOREST PRODUCTS LTD.
MR. D. CURTIS) MR. J. EBBS)	ONTARIO PROFESSIONAL FORESTERS ASSOCIATION
MR. D. KING	VENTURE TOURISM ASSOCIATION OF ONTARIO
MR. H. GRAHAM	CANADIAN INSTITUTE OF FORESTRY (CENTRAL ONTARIO SECTION)
MR. G.J. KINLIN	DEPARTMENT OF JUSTICE
MR. S.J. STEPINAC	MINISTRY OF NORTHERN DEVELOPMENT & MINES
MR. M. COATES	ONTARIO FORESTRY ASSOCIATION
MR. P. ODORIZZI	BEARDMORE-LAKE NIPIGON WATCHDOG SOCIETY

APPEARANCES (Cont'd):

MR. R.L. AXFORD	CANADIAN ASSOCIATION OF SINGLE INDUSTRY TOWNS
MR. M.O. EDWARDS	FORT FRANCES CHAMBER OF COMMERCE
MR. P.D. McCUTCHEON	GEORGE NIXON
MR. C. BRUNETTA	NORTHWESTERN ONTARIO TOURISM ASSOCIATION

INDEX OF PROCEEDINGS

INDEX OF EXHIBITS

---Upon commencing at 9:15 a.m.

MADAM CHAIR: Good morning. Please be seated.

Good morning, Mr. Freidin.

MR. FREIDIN: Good morning.

WILLIAM WADE CARR, Resumed.

CONTINUED CROSS-EXAMINATION BY MR. FREIDIN:

Q. Dr. Carr, one of the important factors in terms of potential for site degradation is terrain. You indicated that the only information that you had in relation to Ontario conditions were the Northwest FEC Guide and Interpretation Manual.

Could you tell me, sir, is there any information in those documents dealing with topography?

A. In addition to the Northwest -- I also mentioned yesterday the Northwest.

Q. All right. Well, what --

A. I also have the Clay Belt Guide.

Q. All right.

A. The only information specifically with regards to topography is not written, it is presented in a graphic form in the description of the sites.

Q. Would you show me either in the Northwest or the Clay Belt what part of the document

you're referring to?

A. For example --

Q. Can you give me a page number?

A. That's what I was going to do. For example, on page 63, vegetation V-type classifications, V-30.

Q. Right. We're looking at the FECs for Northwestern Ontario?

A. That appears to be the one, yes.

Q. All right.

MR. FREIDIN: Show the Board what we're talking about. We're talking about this little diagram here.

Q. Dr. Carr, is there any information in any of these documents in regard to per cent slope?

A. There's no information that I'm aware of in here with regards to per cent slope.

Q. I suggest to you, sir, that if there's no information in this document on per cent slope, and that is the information upon which you put forward your opinion that the conditions were similar between British Columbia and Ontario, that in relation to the issue of terrain you had no information upon which to make a comparison and to prefer the opinion that you gave.

Could you respond to that, please?

A. That information -- this particular guide is not the only information that I used in formulating my opinion and presenting to you that I felt that terrain in parts of British Columbia were similar. I overlooked your last question and --

Q. My last question today or my last question yesterday?

A. Your last question that I just answered prior to this one, sir.

Q. All right.

A. With regards to the ecosystem classification, the FEC manuals and per cent slope. If you would refer to the Northwest Ontario Forest Ecosystems Interpretations book.

Q. Yes.

A. And to page 3-18--

Q. Yes.

A. Under Silvicultural Interpretations, Soil Erosion Hazard, there is a per slope class in that hazard key of greater than or equal to 10 per cent and less than 10 per cent, so that would give me some idea that there are slopes greater than 10 per cent and less than 10 per cent in the area of operation.

Q. So the Board knows what we're talking

about, we're talking about this reference on 3-18 where there's reference here to slopes greater than or less than 10 per cent.

Firstly, Dr. Carr, do you agree that there is nothing in this document which indicates the frequency with which one finds slopes greater than 10 per cent or less than 10 per cent in the area which is the subject matter of this particular FEC?

A. With regards to this particular FEC, I was able to find no distribution of frequency, however, it shows that they do exist and there are similar slopes in British Columbia that are forest operations are undertaken, which I discussed, on flat ground less than ten per cent and greater than 10 per cent and I can produce that information for you.

So that is a reason for making a valid comparison that I tried to put forth yesterday, in that there are -- I never claimed, or attempted to claim that all of British Columbia is similar, but that there are logging operations on similar terrain.

They're obviously terrains greater than and less than 10 per cent and in Ontario we have terrains greater than and less than 10 per cent.

In British Columbia forest operations are undertaken in those areas and the specific areas that I

concentrated my information to deal with the more gently sloping terrain, the rolling flat terrain which does exist in British Columbia where they do harvest forests. That is the information that I basically -- I said somewhat, they are similar terrain.

Q. Dr. Carr, there's probably no question that there are areas of British Columbia where you've got areas with slope less than 10 per cent, and we know that in Ontario we have areas with slope less than 10 per cent.

But a certain approach was developed in British Columbia, and would you agree that the area in British Columbia, taken as a whole, is quite dissimilar to Ontario in terms of topography, terrain if you just look at this little thing here that says slopes greater or less than 10 per cent.

A. You asked a series of -- there were several questions in there. Could you put them one at a time, please?

Q. Do you think it's important when you're trying to determine the potential for site degradation and the need for certain approaches to the potential for site degradation to have some sense of the amount of area which would be in steep terrain and the amount of area which would be in relatively flat

terrain.

A. Yes, sir, I do think it is important that you have some relative understanding of the amount of area involved in comparing steep and flat terrain, and if you would like to take a look at this map that was requested that I review yesterday, specifically the class --

Q. Well, that map you're looking at, sir, I believe is a soils map; isn't it?

A. It has terrain information on it, sir.

Q. Okay.

A. There is a topographic phase component of the key, the area of undertaking outlined -- generally the terrain, I mean, the topographic phases are both, there's flat, there is flat terrain there.

Q. Let's read --

A. There is rolling terrain as well are designated on the key, it's a very broad sweeping document.

If you look in British Columbia the areas that I was discussing primarily, which is around Prince George.

Q. This area which has all the C2s on

it?

A. Which is the C2s, that also includes up in here. This is the Peace River country, the central plan that I referred to yesterday.

Q. Just talking then the C2s then and the H3s?

A. Yes, they are in that area.

Q. Thank you.

A. If you look at the designation you see the same rolling topographic phase, which is defined as dominantly and rolling to hilly.

There are also components, if you look up into this area about the -- well, really the H3 here above Fort Nelson, there is no topographic designation indicating that it would be flat.

Q. All right. Dr. Carr, the C2 area, just talking about the topography now, not necessarily the kind of soil, would you agree that the C2, which is predominant in the area that you were referring to in your evidence, doesn't appear very frequently in Ontario, in fact, it only appears here around Kapuskasing and north of Lake Abitibi?

A. Excuse me, C2 is a soil type, sir, it is not a topographic phase.

Q. I'm saying -- I'm just asking you the

question. Would you agree that C2 only appears in a couple of places in Ontario, in the area of Kapuskasing and north of Lake Abitibi and over in the Dryden area?

A. At the scale of this map which, is 1:5,000,000 where there's a broad range of culmination --of bringing <-G> together of units to make descriptions that can fit on this map with any type of interpretation on a broad sweeping scale, there are major areas, and this is 1:5,000,000 scale within the area of the undertaking and the C2, and there are also areas within British Columbia.

That does not mean that other soil types on a more localized scale and ecosystem scale which I addressed my information to, I never said that all of this area was applicable, I kept it very specific to ecosystem types and soil types that were relatively similar between these two areas.

Q. Now, Dr. Carr, you told me earlier that it was important to know the amount of area or the extent of certain types of soils and the extent to which you would find similar topography.

We've looked at the limited information -- well, we've dealt with the topic of terrain in the FEC guides. Could you tell me, sir, in relation to the Northwest FEC, what information, if

any, is provided regarding the amount of any particular V-type or S-type one would find in the area which is the subject matter of that FEC? I suggest to you there's nothing.

A. Could you repeat the question without your answer, sir.

Q. All right. I'll put the question another way. I suggest to you, sir, that there is no information in the FEC guide for Northwestern Ontario or the interpretation manual that tells one how much, the extent, or the distribution of any specific V-type or S-type which is the subject matter of that FEC. Do you agree or not?

A. The V and S information is specific information in the FEC.

Q. Well, you read the FEC. You're the expert, what is the V and the S-type, sir?

A. Excuse me, sir. I answered your last question without several -- I answered the last question that you ended with which was: Were not the V and the S-type the information in this FEC manual.

Q. No, I didn't ask that. I said: Is there any information in relation to the S and V-type regarding their extent and distribution.

A. There is no direct information in the

manual, however, I've never stated that it was -- I never tried to put any indication onto the extent throughout the area of undertaking of how pervasive the problem was only that it did occur, it had the potential to occur, and my intent was that it should be looked at very specifically.

Q. So you're saying now that the problem -- you have no information then as to whether the problem is as pervasive in Ontario as it is in British Columbia; is that what you're saying?

A. I have no information to gather whether it is as pervasive, no.

Q. As pervasive. So when we look at your witness statement and you say it's a pervasive problem in British Columbia and we listen to your evidence that it's a pervasive problem around the world, we are now to say that that doesn't necessarily mean that it's pervasive in Ontario?

A. There is no basis to even make the statement one way or another.

Q. Thank you.

A. It is that type of information that needs to be dealt with and gathered. You cannot make a statement one way or another without the data.

Q. Right. And suggest to you, sir, that

whether one decides to go out and collect that data and to give the subject matter attention has got to be based, surely, on the extent of susceptible soils and the relationship, or how soils in fact occur in relation to slope, because it's soils and slope together which really give you the big problem.

A. You have now -- yes, it is soils and slope that give you the big problem and you do not have to rely totally on slope, the soils become involved as well, there's more information with regards to soil distribution.

In my making the statement, I went through, I looked at the various soils in the area of the undertaking, reading a document describing the type of soils, and looked to see in British Columbia if we had soils of similar development and soil classification, which indicates a degree of similarity.

Q. Now -- a degree of similarity. Now, sir, I'm going to give you a hypothetical because I want to get a handle on what you mean by similarity.

If you were in British Columbia and I was in Ontario and we decided we were going to have a horse race and you had an animal out there that had a head and I had an animal that had a head and four legs and a tail and they were both horses but the components were

put together so you had a Clydesdale and I had a thoroughbred, I suggest to you it would be ridiculous to be talking about the conditions being similar in relation to whether or not, in fact, you could predict who was going to win the race?

What I'm suggesting, sir, it doesn't make any difference whether there's a few similarities, it's the way those similarities appear and are put together in the physical environment, not the mere fact that (a) I've got a little bit of this and you've got some of the same.

A. I disagree with your premise. The need and the use of classification is to group -- the classification is an ordering, an arrangement of objects and the distribution of them into compartments, the purpose is to arrange the ideas and objects in order that the ideas accompany and succeed the knowledge in the way that gives the greatest possible command of the knowledge and leads to the direct acquisition.

In regards to classification of soils, it is a very important aspect of dealing between regions with regards in similarity, a podzol in British Columbia is a podzol in the area of the undertaking.

The soils that I've been able to discern

based on the information available in British Columbia in the areas that I described as being the boreal component where I tried to address all my answers, were brunisols, podzols, luvisols and gleysols.

And I would like to point out that when you look through the FEC guide with regards to the S designation, sir, that in association with that they do give soil classification information as to whether a soil is a brunisol or luvisol over, and these are developed on glacial -- it gives you the parent material that they are developed on, and it is the parent material, the climate, all which goes into the development of the soils overall so that you can compare in a reasonable manner podzols, luvisols in one region to another.

Q. Dr. Carr, I suggest to you that you can go to any northern temperate forest in the world, Russia, Sweden, Finland, and you will find all of those soil types that you refer to, podzols, brunisols, luvisols; am I correct?

A. You will find them throughout those areas, and that is one of the basis for the movement of research between various forested areas and various components of research, is that a researcher can look at data and make the transfer and this organization

itself transfers a great deal of research from other parts of the world and has incorporated that into their planning process in the development of their guidelines.

Q. So really I guess what you're saying is that the soils of the world in the northern temperate forest are similar?

A. To the degree that the level of classification will give that as to whether they're brunisols, podzols, if you have more information you can define that much better.

Q. Now, sir, you looked at the soils map last night?

A. Yes, I did.

Q. And I took a look at it earlier and I think you're right, there are brunisols, podzols, luvisols over here in British Columbia and we've got them over here in Ontario; right?

A. They are both in each section, yes.

Q. Right. What about the topography that they exist in, they're different; aren't they?

A. You have at this scale, which is very gross -- I mean, at a very broad scale 1:5,000,000, to start making assumptions that there is no similarity here is very far-fetched, but within the realm of

lumping that this map particularly deals with, there are areas, here are podzols on rolling -- on this rolling to hilly topographic phase, you also have this podzol with regards to this rolling terrain. At least on a broad sweeping scale that information is here.

Q. Right. Now, we are comparing an area 3,000 miles apart. I suggest to you, doing it at this particular scale is not uncommon or unreasonable?

A. Sir, I think it is very unreasonable to start making broad sweeping statements based on this scale of map that there's no similarity between a podzol here and a podzol there.

Q. All right. Well, I'm talking about the susceptibility of site degradation. We're going to get to soils in a little more detail, sir.

But let's do this at a very general area. D3 is the soil type which predominates in the area of the undertaking; would you agree with that?

A. Sir, D3 is on that map at a wide range, it is complex of soils and it is not very specific and I don't really think that pursuing on a scale of 1:5,000 is sufficient.

When I presented my data I was very specific in trying to deal with soils on an ecosystem basis, which is what I based my components on, whether

it was our system of an SBS such and such and that type of comparison to the information in these guidelines.

Q. We're going to get to your ecosystem classification in a moment, sir. Would you just answer my question, please. Would you agree --

MR. O'LEARY: He just did, Mr. Freidin.

MR. FREIDIN: No, he did not. He told me that -- he didn't answer the question.

Q. Is D3 the primary soil type on this map; yes or no? Don't tell me whether you think it's reasonable that I look at it that way, that's a matter for argument. Am I reading the map correctly or not?

MR. O'LEARY: With respect, Madam Chair, the answer has been given. He said it is not reasonable and that is his response.

MR. FREIDIN: The fact that it's not reasonable, Madam Chair, may be this witness' professional opinion as to whether the questions I'm asking are going to be of any use to me or my client at the end of the case.

MR. O'LEARY: The fact that he says your question is balderdash is a good response.

MR. FREIDIN: No, sir. I'm asking him a simple question. Well, I want the answer to the question, Madam Chair.

MR. O'LEARY: While I'm on my feet, Madam Chair, Dr. Carr did ask for three documents and I asked our assistant Ms. Long to pick them up at the reference library. Is it appropriate that I provide them to him?

MADAM CHAIR: Yes. Any objections?

MR. FREIDIN: No.

MADAM CHAIR: Go ahead.

MR. FREIDIN: Madam Chair, I guess we need a ruling as to whether I get an answer to my question.

MADAM CHAIR: Yes. The Board is going to overrule your objection, Mr. O'Leary.

Could you please answer Mr. Freidin's question.

THE WITNESS: May I organize this first? This has just come in.

MADAM CHAIR: Go ahead, take a minute.

---Discussion off the record

MR. O'LEARY: Madam Chair, while we have a break I should apologize. I failed to introduce Ms. Freya Long, who is an assistant with the Coalition. I apologize, I should have done that at the beginning of the week.

THE WITNESS: I'm ready to begin.

MADAM CHAIR: All right. I believe Mr.

Freidin's question had to do whether the D3 type soils indicated on the map are predominant in the area of the undertaking, and the Board understands your qualification to answering that question with respect to the scale of that map.

THE WITNESS: Thank you.

Yes, sir, the D3 grouping, which is not a specific soil type but -- you know, this map at a scale of 1:5,000,000 represents a broad grouping or association of dominant and subdominant soils which are identifiable taxonomically at the level -- at the order, gray group and subgroup levels modified by very generalized textural and topographic phases to form relatively homogeneous patterns within the landscape.

In that this is only a broad grouping or association of the dominant and subdominant soil groups, I will agree that that D3 is on the area of undertaking, yes.

Q. Okay. And we have some D3 in British Columbia, some here closer to the eastern border and some along the coast.

Let's just talk about the area which is near this interior plateau, all right. Is that the interior plateau or not?

A. That is part of the interior forest

region, however, I do not feel that it's appropriate to deal with the issue of site degradation and the applicability at a scale of 1:5,000,000 that is only a broad grouping of soil types, not to say that there are not soil types in this unit that can be used in comparison.

Q. Is the topography different from the D3 on this map for British Columbia than it is for the D3 in Ontario?

A. Yes, it is, within regards to the scale.

Q. With regards to the scale. The D3 in British Columbia is shown as moutainous; is it not?

A. That is what the topographic phase, which is also - I can read.

Q. I know.

A. Which is also a grouping that is dominantly steeply sloping to mountainous.

Q. Thank you. And the topography at this broad scale in the area of the undertaking is called dominantly rolling to hilly; right?

A. Yes, sir, but that does not mean that neither occur exclusively and that do not occur in either region.

Q. Dr. Carr, the other day you filed

Exhibit 2048, Physiographic Regions of British Columbia. You have a coloured map; do you not, a coloured representation of this map?

A. The coloured map is not a representation of the physiographic map.

Q. All right.

A. It's black and white.

Q. Do you have the original of this, one with some colours on it?

A. No, sir, there are no colours on that one and this document was taken from the Ecosystems of British Columbia. I'll find the page for you, sir. That is Table 9, page 9.

Q. Yes, sir.

A. It is a generalized physiographic representation, yes.

Q. Generalized Physiographic Regions of British Columbia. And all these little bumps and things like this that show up on the reproduction are indicating what?

A. They would indicate at that scale some form of mountainous terrain, although not always all mountainous, that there are flat areas involved.

I would like to refer with regards to that issue and the type of logging going on in British

Columbia to a report that was submitted, FRDA report --

MR. FREIDIN: Well, Madam Chair, I would like him to answer my questions. I would like him to answer my questions, not make a submission.

MR. O'LEARY: Madam Chair, he is responding as best he can. If you put something to him and he feels he has to go to another document to answer the question, Madam Chair, I respectfully submit that's completely in order here.

MR. FREIDIN: If he wants to go to another document to talk about the subject matter I asked; and, that is, what the topography is, that's fine.

I don't want to have a speech on what the logging methods are in British Columbia, that's not what I'm talking about now.

MADAM CHAIR: Okay. The Board is asking the witness to answer Mr. Freidin's question.

THE WITNESS: In regards to topography.

MADAM CHAIR: As succinctly as you can. Let's see where Mr. -- how many more questions do you have about Exhibit 2048, Mr. Freidin.

MR. FREIDIN: A few.

MADAM CHAIR: Why don't we go through Mr. Freidin's questions and at the end of that point, if

there is a need to refer to more material, the Board will consider it.

THE WITNESS: It's very crucial to the answer.

MR. FREIDIN: Q. All right. Well, if it's crucial to the answer, Dr. Carr, I will withdraw my suggestion and you go ahead.

A. The document which was filed - I cannot remember the exhibit number at this moment - perhaps I can provide that.

Q. Which document is that?

A. This is the Utzig, Walmsley Report.

MR. HANNA: 2046.

MR. MARTEL: We don't have the baby blue cover to make it easy.

THE WITNESS: The blue covers are very helpful.

MR. MARTEL: Yes.

THE WITNESS: If you would please turn to page 35, as I said, I feel it's very relevant.

MR. FREIDIN: Q. What page, I'm sorry?

A. Page 35, Table 5.3.

Q. Yes, sir.

A. Basically it refers to the slopes and it's a log question - I'm sorry - Table 5.4, which

deals with the total area harvested between 1976, 1985-86 by various harvesting systems, which is very broad, in this case on specified slope classes, and if you would look at the Prince George forest region --

Q. Which is...?

A. Okay. PR George.

Q. Yes.

A. Go across to the column at the top, it is GR WIN, which is ground skidding winter, and look at the mountainous area that was harvested on slopes less than 35 per cent, which is certainly not mountainous, it's 263,859; if you look at the area under summer ground skidding it's also on less than 35 per cent, it's 227,643.

In other words, the data for this table shows that there's almost -- around a half million hectares of British Columbia in that region was logged using ground based systems, which is very relevant to the case, on slopes less than 35 per cent in not mountainous terrain.

Q. Sir, I just want to -- before I go on, I want to confirm that, notwithstanding your review of the materials I gave you last night, it's still your evidence that the terrain, the soils and the tree species are similar if one compared British Columbia

and Ontario; is that still your evidence?

A. That they are relatively similar, yes, which is how I've always tried to qualify the answer, and that it's on a localized scale where we are looking at the harvesting.

As I say, for 10 years there's 500 -- there's close to half a million hectares logged. Within that we have tried to pull out and show that there is a problem in British Columbia and that there could well be, based on that type of information, a problem that is pervasive in the area of the undertaking, however, no data is available as to the latter part.

MR. O'LEARY: Madam Chair, I don't like to get up very often, I'm saying this after the witness's response to that.

But Mr. Freidin knows the rules of cross-examination, as well as I'm sure he will explain to me the rules of re-examination; and, that is, if you're going to put something to the witness which is a characterization of his witness, you better be right about it.

There has been no evidence, and the witness has just responded to that, that comes close to the characterization that Mr. Freidin has just put to

this witness.

I would simply ask for a direction that Mr. Freidin in future, where possible, attempt to make the characterizations of a witness' evidence that which, in fact, is his evidence.

Q. Dr. Carr - I'll take that instruction to heart.

Dr. Carr, can you come up to the board here, please. I've put up Exhibit 2053A and 2053B. These are two of the pages out of the atlas that was referred to yesterday.

Now, can you agree, sir, that these two maps show - again at a particular scale, you're quite free to comment on - the topography in the two regions depicted?

A. For your information, the scale of these two particular maps is 1:5,600,000.

Q. Thank you. By the way, what's the scale of the physiographic map Figure 9 in the FEC document which you've got from British Columbia?

A. Do you wish me to answer this question?

Q. No, answer the question I asked first. What's the scale of the physiographic map, Figure 9, from the BC document that you filed as

Exhibit 2048?

A. I can find no scale on this particular map, however, on a map of the same -- it will be very similar, it's around 1:7,500,000, approximately.

Q. Thank you. So let's deal with these two exhibits here which are - I always get this mixed up - but which is at a different scale, 1:5,000,000 I think.

A. That is what the -- 1:5,600,000, yes.

Q. Which has the better resolution, 1:5,000,000 or 1:7,000,000 plus?

MR. MARTEL: Wait a minute. Is the -- I wrote down 1.7,000,000.

MR. FREIDIN: Q. 1:7,000,000 is Exhibit 2048; is that right, Dr. Carr?

A. Yes, it is.

Q. The maps that are Exhibit 2053A and 2053B are 1:5,000,000; is that correct?

A. Yes, it is.

Q. And which one is as finer resolution in terms of -- well, which one is a finer resolution, if I can use that term?

A. You would have to define, resolution as to what?

Q. All right. Which one's a larger scale.

A. The 1:7 -- I confuse sometimes these larger or smaller scale issues.

Q. So do I, that's why I asked you.

A. Well, a lot of these things -- I don't often deal with scales at this magnitude, I usually deal with fairly localized scales with my own personal work and this is the 1:5 --.

Q. 1:5,000,000.

A. 1:5,000,000, and this one --

Q. Is 1:7,000,000.

A. In regards --

Q. Exhibit 2048.

A. --in regards to areal extent.

Q. No, I'm talking about in terms of just looking at a specific piece of geography, which one is the larger scale?

A. The 1:7,000,000 will give you a larger area for a given unit of measurement, yes.

Q. All right. You might be able to get more on a map, but you say you work at a different scale, sir.

A. On average.

Q. 1:15,840 is that a common scale, is

that a scale that you're familiar with?

A. It is a common scale and one that I'm familiar with.

Q. All right. and if we had a map like Exhibit 2053, a map the same size as that and if you wanted to show something in British Columbia and it was at the scale of 1:15,840, we wouldn't be able to get the whole Province of British Columbia on the piece of paper; would we?

A. I would think that would be very difficult, sir.

Q. Very difficult. So the 1:15,840 is a larger scale? In other words, things get bigger, you can see more clearly what's on a specific area of geography if you're at 15,840?

A. I will go with your definition.

Q. So you can see more then of what you'd see in a specific area if you're looking at 1:5,000,000 as opposed to 1:7,000,000?

A. It would be a matter of what you're looking at and what went into making that determination.

You can draw fabulous maps with very little data at wide scale, it just depends on the parameter you want to look at and the data that went

behind the making of the map.

Q. All right.

A. That would be the resolution, you know, the interpretation, the ability.

Q. Let's put it this way. Let's put it this way. Let's look at Exhibit 2053A, it shows differences of elevation and topography generally in British Columbia; agreed?

A. It does show at that scale differences in British Columbia.

Q. Now, sir, the exhibit that you put in, Exhibit 2048, to show the generalized physiographic regions of British Columbia which is at 1:7,000,000, would you agree that it doesn't show as clearly - if one wants to get a sense - doesn't show as clearly the topography of British Columbia as does Exhibit 2053A?

A. That was not the purpose of this particular map to show you graphically using colours of a wide range to give you this interpretation.

Q. Okay, let's not worry about scales anymore, let's just go to the exhibits, sir.

I'll take Exhibit 2048 for the moment and I'll stick it up here. Can you just tell me, looking at the interior plateau that you were talking about, looking at the interior plateau that your evidence

focused on I believe--

A. Yes.

Q. --would you tell me where generally it appears on Exhibit 2053 in terms of the colouration?

A. It primarily deals around -- this is the Town of Prince George which I referred to several times, sort of right in the middle here, and the interior plateau would be in this range denoted by the large constant areas of a lightish brown texture and some more interspersed areas of darker brown colour.

Q. Where is the -- okay. If we look at Ontario, Exhibit 2053B, and we look at the area of the undertaking, is the topography depicted the same as the topography in the area you referred to, or is it different?

A. At this very large scale and in the grouping that has gone on, from a topographic standpoint there are broad areas of flat ground ground in this area of the undertaking, and at this scale there are also areas denoted as being relatively flat ground around the area of Prince George, and that is the type of area that the timber harvesting operations are confined to with regards to that less than 35 per cent slope.

Q. You mentioned earlier in your

evidence about classifying soils, I think it was in the context of our discussion about finding brunisols, luvisols, you know, across northern temperate forests, you gave some evidence about classification?

A. I read a generic description of what classification is.

Q. If one is concerned about managing a certain aspects of the environment, the natural environment and you have a general classification, you talk about the soils, the type of soils that you might have, what's the next step usually in that -- after you do a general classification of what exists in a particular area; is there a next step?

A. The next step in regards to what type of activity?

Q. Well, is it common that after you get a sense of the general soil types, the next thing one might want to do is to map it?

A. That has generally been the case undertaken by the Department of Agriculture in the soils mapping that has been done in Canada, yes.

Q. Why do you map it?

A. The mapping is often a result of the lumping together of the characteristics -- that you map and put these beings together at whatever scale for the

purpose that you wish, that is the key component, that is suits the purpose, and when you map it, you draw some boundary that you have defined around which the groups that are similar are organized, and the idea of mapping is that this can then be delineated and you can look, sort of as I mentioned earlier, if you look at a podzol soil in one area of your undertaking, went to a similar podzol -- a podzol soil in another, there would be some inherent similarities in the properties.

Q. You make the comment in your witness statement about certain -- one similarity I think is that soils in the area of the undertaking and soils in British Columbia were created as a result of glacial action.

MR. O'LEARY: Which page is that, Mr. Freidin?

MR. FREIDIN: Q. Actually if you look at MNR interrogatory No. 9 which is part of Exhibit 2043. Do you have that?

When you have that document, Dr. Carr, tell me, please.

A. You are referring to the interrogatories on Coalition Panel 3 submitted by Ministry of Natural Resources and the Ontario Forest Industry Association?

Q. Yes. I'm just referring to the Ministry of Natural Resources interrogatory, Dr. Carr. It's on page 6 -- it's page 6 at the top -- pardon me, No. 6 at the top of the page, and the first question on that page is 8.

A (indicating)

Q. Right. And there is Question 9.

A. Thank you.

Q. You were asked to which forest areas in Ontario you were referring to in making the statement that physical terrain conditions resemble many forested areas in Ontario.

You made the comment in the fourth or fifth line of the answer, near the bottom of the page:

"Also, the soils in both areas are primarily glacial in origin and are classified similarly."

Now, sir, are the soils of the area of the world which would have northern temperate forests on them, is it true that they were all created primarily -- well, their origin is glacial?

A. Not all of them, sir. There are areas within British Columbia that, for some reason, glaciation missed, so there are exceptions to that statement.

Q. Okay, thank you. And when you say then they are classified similarly, I take it that you are referring to your earlier evidence about there being podzols, brunisols, luvisols, that sort of thing?

A. That sort of thing has derived on glacial soils, podzols developed on glacial soils. There are podzols that are not necessarily developed on glacial soils, but in this instance I was dealing with the glacial origin soils that become classified as podzols or brunisols.

Q. Thank you. It was at that very general scale that you were speaking?

A. It was at a general, scale, yes, I did not specify a scale.

Q. Now, are you familiar with specific management practices which occur -- actually, this C2 classification on Exhibit 2054B, are these what are described generally as finely textured soils? Can you tell by the legend here?

A. That is a grouping and you will not be able to tell if -- there is a range probably -- based on the information that went into this classification, there's probably a range of soils within this scale of association type map.

Q. So you can't make that broad

characterization as to whether they are finely textured or not?

A. I did not know the information that went into the development of the -- how they came about this kind of characterization at this scale. I would have no information to make that -- answer that statement in regards to this map.

Q. Is there any indication in the book about C2 being primarily luvisols?

A. About -- which book?

Q. Well, I guess the book from which the Soils of Canada -- the Soils of Canada, can you tell me whether -- actually here we go over here.

Dr. Carr, you can bring the book here but I think we may be able to shorten this a bit. The C2 is defined or indicated on Exhibit 2054 as being gray luvisols (gray wooded).

Can you advise me whether those sorts of soils tend to be -- as a result of their manner in which they were created, tend to be finely textured soils?

Sir -- you're a soil scientist, sir. Are you not able to answer that general type question without looking in the textbook?

A. I do not want to give this Board the

wrong answer, I would like to -- any time you ask a question of a specific nature, which that was, referring to a document that at a very broad scale, I don't know the assumptions that went into it, I would like to, in answering your question, look at the document as to how they describe it at that scale with their assumptions.

Q. Very well.

A. Please, may I proceed, sir?

Q. Yes, sir.

MR. FREIDIN: All right. I'm just wondering whether -- well...

Madam Chair, I don't know, it's almost the break time. Maybe Dr. Carr could usefully use part of his coffee break to deal with it.

I could ask a few more questions and let him go back to this after the break. I'm in your hands.

MADAM CHAIR: Can you continue on with your questions without the answer to this one, Mr. Freidin?

MR. FREIDIN: Yes, but I would like the answer to this one in particular.

MADAM CHAIR: All right. Would that be easier, Dr. Carr?

THE WITNESS: Yes, Madam Chair. May I have the question for reference, your specific question?

MR. FREIDIN: Q. My specific question was: Are luvisols soils which are created through a glacial process which causes luvisols to generally be finely textured soils?

MR. O'LEARY: Is it no relationship --

MR. FREIDIN: Not necessarily the glacial process. Are luvisols soils which are generally finely textured. That's my question.

MR. O'LEARY: Is there any relationship to the map now in that question?

MR. FREIDIN: Well, I can ask the question generally. And, secondly, is there any indication in the Soils of Canada as to whether gray luvisols are or are not finely textured?

A. Based on this map and this document?

Q. Yes, sir. This document you're referring to is the Soils of Canada?

A. Yes. The first question is: Are luvisols --

Q. Generally finely textured soils. without reference to the book, sir, as a soils scientist, can you answer that question?

A. With regards to this broad grouping f classification --

Q. No, I'm not talking --

A. That is what your question is referring to, sir.

Q. No, no.

A. If you want to ask about luvisols in a broad sense, we can do, you know --

Q. Okay. Luvisols in a broad sense, without any reference to that map and the Soils of Canada, can you comment -- is it an answerable question whether luvisols are generally finely textured soils?

A. It is an answerable question.

Q. Unanswerable?

A. It is an answerable --

Q. All right. And what is the answer,m sir?

A. Off the top of my -- as I understand, they tend to be fine textured soils.

Q. Now, as you understand -- now, do you say 'as I understand' because you're really not an expert in relation to the different types of soils and it's, therefore, your understanding as a result of some general reading? Is that what you mean by 'as I understand'?

A. I'm not an expert in soil classification taxonomy.

MR. FREIDIN: It might be a good time for a break, Madam Chair. All right, I could go on.

Q. I still want you to answer the question about what that document, the Soils of Canada, says about this?

A. About the luvisol question.

Q. About the luvisols.

Now, however, whatever you find in there, we have established I think earlier that the C2 area appears in the interior plateau of British Columbia and it has limited appearances in the area of the undertaking, those limited areas being in the area around Kapuskasing or north of Lake Abitibi and over in an area around Dryden.

Are you aware, sir, that the area which is identified C2 and G2 in the Kapuskasing area is known as the Clay Belt?

A. I'm not familiar with the local generic classifications, this being the Clay Belt.

Q. All right. Are you aware of the timber management activities, if any, which are designed to take into account the susceptibility of the soils in that area to compaction?

If you're not, Dr. Carr, that's fine, I just want to know whether you are or you're not?

A. From reading the information that was -- some of the exhibits that were provided to me with regards to timber harvesting operations in the area of the undertaking, there are mentions of the use of wide tired skidders which is often incorporated into your timber management plan to deal with soils that are susceptible to compaction, and also the use of winter operations to try to offset impacts of insensitive sites.

Q. Thank you. By wide tires, do you include tires which are called high flotation tires?

A. Wide tires, as we deal with them in British Columbia, are high flotation tires. In British Columbia we also use other type of low ground pressure equipment which I believe is also applicable to the area of undertaking.

Q. Are you aware, sir, as to whether, in this area around C2 in Ontario, whether there is any express indication of the amount of bearing pressure which is sort of set as a target beyond which it is desirable that equipment not go?

A. I'm not familiar with the details of operational specifications in the area with regards to

bearing pressure.

Q. Thank you. Could we put up the map from Roe which shows the Forest Regions of Canada. Did you keep that one last night, Dr. Carr?

A. Yes, I did, and I appreciate the opportunity to refresh myself with regards to this document.

Q. Dr. Roe (sic), you said that you haven't looked at that particular text for some time.

A. Excuse me, sir.

Q. You said five --

A. No, you called me Dr. Roe.

Q. Oh, I'm sorry.

A. I'm not Dr. Roe.

Q. Dr. Carr, sorry.

A. I'm Dr. Carr.

Q. You took your undergraduate forestry work in Oregon; is that correct?

A. At Oregon State University, sir.

Q. And you took your masters in the University of British Columbia?

A. Yes, I did.

Q. And the work at the University of British Columbia was in relation to the rehabilitation of roads and landings, I think?

A. No, it wasn't.

Q. It was in relation to what?

A. It was in relation to soil erosion, control and measurement of soil erosion with regards to road construction.

Q. Did you study Roe's Forest Regions of Canada when you took your undergraduate work in Oregon?

A. That was not the predominant document that we looked at, although in general ecological -- forest ecology courses, it was a reference to getting an understanding on a broad scale on which this document is written of the type of forests across Canada.

Q. Now, in your evidence, Dr. Carr, am I correct that you have stated that the area of British Columbia which you were testifying about and comparing to Ontario was in the boreal forest?

A. Yes.

Q. Can you come up and join me here so we can look at Exhibit 2052B together. On this map, sir -- I believe in your evidence you talked about the area around Kamloops.

A. The area in the Kamloops forest region, which is one of the major forest regions in the interior, that is much -- I can't give you -- it goes

from approximately this area at Lillooet all the way over to the mountains. I believe the border is around Revelstoke, which is part of the Rocky Mountains, comes to the south, very dry, the northern extent is probably about a third of the way towards Williams Lake.

Q. Would you agree, sir, that based on Roe's Forest Regions of Canada, taking into account the general broad scale at which it is, that none of that particular forest region is in the boreal forest?

A. Based on the broad scale of this map and the lumping together to make it a presentable document in a sweeping statement, there is not evidence from this type map that there are or are not boreal forests in that region, only that they are not visible or unvisible at this scale.

Q. Well, let's -- I think you also talked about -- I'm looking at Tab No. 9, Dr. Carr, of the witness statement, and would you turn Tab No. 9, and would you turn to Table No. 1, please, page 5.

A. Thank you.

Q. And the first -- the Forest Regions of British Columbia I believe are listed under the first column entitled Regions; is that correct?

A. These are the regional offices of

administration or the breaking down the province from an administrative standpoint.

Q. These are areas -- yes, but they are areas which are geographically defined?

A. They are geographically defined, yes.

Q. All right. The Cariboo Forest Region, does it or does it not appear in the section of Roe's Forest Regions of Canada which is marked or identified as boreal?

A. There are components of the Cariboo over on this far side that are exhibited at this large scale to be part of the boreal forest.

Q. Which parts of those, sir?

A. This right here, this brownish colour is part of the broad ranging definition of boreal forest. There are also components near Wells, that is also in the Cariboo Forest Region.

Q. It's shown here as subalpine. Are you telling me that I should read these that subalpine is a subcategory of the boreal?

A. I'm sorry, I was looking at -- the colours are a little different. It says here, on a broad spectrum, I withdraw that. At this scale it is indicated as subalpine and the grouping that goes with regards to this type of scale operation, this type of

scale map.

Q. What about the next forest region, Nelson, is it in the boreal forest?

A. I see no part of the area at this scale and the grouping considered at this scale in the boreal forest.

Q. What about Prince Rupert Region?

A. A great deal of the Prince Rupert Region is classified as boreal forest. The Prince Rupert Forest Region is defined -- just this side of Vanderhoof and extends to the northern end of the province.

Q. So I can pick up a little bit of the northwest corner?

A. There is -- I cannot estimate. There would seem to be a fair bit in the northwest corner.

Q. All right. And Prince George is an area which, I understand, does in fact extend into the boreal forest as shown on this map?

A. The Prince Rupert extends into the boreal forest as shown on this map and Prince George also extends into the boreal forest as shown at this scale on this map.

Q. All right. Now, when you're talking about the general scale at which this map is shown,

first of all, can we agree then that three of the forest regions in British Columbia do not appear or are not in the boreal forest according to Roe's Forest Regions of Canada?

A. Using the scale of 1:5,000,000, which is the basis - excuse me, I'm starting to cross maps here - I don't have that number offhand, I was not able to convert their level of scale.

However, it appears that a lot of areas pertaining to a very small space on this map, that there are parts of these three regions -- that these three regions do not appear contained at the groupings level at which this was done, it's a reference book.

The purpose of the book - if you would like to read the forward which you provided me yesterday - it is a general description at a national scale with regards to those areas do not have -- used in the way this was a national scale boreal forest according to Roe.

Q. Sir, what was the last comment, I didn't hear your last comment.

A. I said that scale of defining and describing the forest heading of regions of Canada using this approach -- this map to describe them at a national scale, the presence or non-presence of boreal

forest is not -- cannot be discerned in the groupings on this map.

Q. Let's assume for the moment, Dr. Carr, that there is some boreal interspersed in the subalpine forest region, the Montane Forest Regions, the grasslands and the Columbia Forest Region which don't appear in the area we're talking about, let's just assume for the moment there's some boreal.

A. I do not like to make broad assumptions like that.

Q. You say this is boreal?

A. This is boreal.

Q. For the purpose of my question I will accept your evidence. It's not appearing in significant enough quantities to show up on a map of this scale?

A. On that scale, using the type of criteria he used to define the criteria for lumping of these broad expanses is not in the book, it's from -- this map has been unchanged since 1959 and I think that the understanding of resolution of these forests may be a little bit better than 1959.

Q. Well, all right. You don't like to -- you just told me you don't like to make assumptions, sir. Are you telling me that you are now

assuming that maybe the Forests of Canada have changed significantly enough since 1959 that you should now change the line on the map?

A. Not the forests, sir, the classification, the level of data with which the resolution of this map was made.

Q. I think -- did we not agree earlier in your cross-examination that Roe in fact distinguishes between forest regions based on a number of parameters which include climate, soils and terrain.

A. Its does in the creation of the forest sections, but it does a broad scale lumping.

Q. In terms of the forest regions?

A. Yes.

Q. All right. Thank you. Let's talk about the area and this degree of resolution. We have a degree of resolution that I feel you're being somewhat -- well, you describe as very broad in terms of distinguishing between boreal and other forest regions.

Would you agree, sir, that Roe's Forest Regions of Canada has divided the boreal forest into sections; in other words -- can you answer that, are there different sections of the boreal?

A. In this map there are three sections

of the boreal lumped together within the terms of whatever the criteria were for making it.

Q. And those are predominantly forest, forest grassland and forest and barren?

A. That's what the map says, sir.

Q. Dr. Carr, you have come forward and given opinion evidence as an expert in soils, you have given evidence about the similarities between British Columbia and Ontario; why don't you know, sir, that all of the numbers which appear on this map indicate that there are over 19 different forest sections within the boreal forest?

There aren't just three. Roe has gone down to a point of resolution where they've identified -- I see the numbers go up to 22. Why don't you know that?

A. I view this reference as a broad general reference, this type of operation. The evidence that I presented was dealing with very specific components within this lumping.

I do not deal with, in my operations -- in my work, broad sweeping lumping that is there and I do not study or spend a lot of time looking at information that I feel is not relevant to what I wish to see.

I did not memorize this, I do not have it at the top of my head.

Q. I didn't ask you to memorize, I gave you the book last night and you indicated you're familiar with it.

But let's go back then to the area that we are talking about, this interior plateau. What is it, sir, about that area that makes you say that there is boreal forest there?

What are the parameters that you use to suggest -- or, pardon me, that you indicate makes boreal forest exist in that particular area?

A. If I may, we have the coloured map which we referred to earlier, the Ecosystems of British Columbia, this is the basis on which I have made that description. We have a map available for distribution.

Q. All right. We're looking at a map which is in -- is it figure --

A. Yes, Figure 10.

Q. Figure 10, in Ecosystems of British Columbia, February, 1991 Report?

A. Yes, it is.

MADAM CHAIR: Do you want to make this an exhibit?

THE WITNESS: I would like to put this in

as an exhibit.

MR. FREIDIN: I have no problem with that. Do you have extra copies of that?

MADAM CHAIR: This will become Exhibit 2057 and the title, again, please?

THE WITNESS: It is Figure 10, Biogeoclimatic Zones of British Columbia, and it's from the Ecosystems of British Columbia, February, 1991, Special Report, Series 6.

---EXHIBIT NO. 2057: Figure 10, Biogeoclimatic Zones of British Columbia, from Ecosystems of British Columbia, February, 1991, Special Report, Series 6.

THE WITNESS: That was compiled and edited by Del Medinger and Jim Pozer - I believe I mentioned that they were asking about the spelling yesterday.

The area in the central plateau where I was directing and trying to confine my evidence is in the subboreal spruce zone as it is classified under the British Columbia system.

MR. FREIDIN: Q. All right. And that's this...?

A. This is the subboreal spruce, up in these blues here.

Q. All right. If we just look at the map, there's an area here over at the left side in the

light purple colour, Ootsa Lake, is that the colour which is subboreal spruce?

A. That's what I can't tell from the way it's xeroxed, and it does -- that how it appears here, yes.

Q. That's the area you're talking about?

A. It goes from Ootsa Lake over to well north of Stewart down -- if you look down the Quesnel River, it's that unit, sir.

Q. So it's this area here. Perhaps you should come here, Dr. Carr. I want to make sure that I'm not --

MR. O'LEARY: Maybe I can see that too.

MR. FREIDIN: Q. The area that I think you indicated to me, that being the area you're talking about as being boreal, is this light purple area?

A. That is not all the boreal, that is the boreal where I've done most of the work and the evidence presented as a regional problem.

Q. Right. So this similarity is from your knowledge of this particular area in the light purple?

A. That area, as well as the area up in what's called the Peace country, this darker blue -- this lighter blue with the boreal white and black

spruce.

Q. Right.

A. I've also done a little bit of work up in this spruce, willow, birch classification up here - were you able to follow it - most of the green, this lightish blue, and this broad expanse of blue which is in turn British Columbia and there's a mess of subboreal spruce.

Q. Now, Dr. Carr, I'm going to stick these two up here, I want to ask you some questions about those now.

MADAM CHAIR: Mr. Freidin, is this a good time to have our morning break?

MR. FREIDIN: Yes.

MADAM CHAIR: The Board will take a 20-minute break now.

And before we do, we would just make the comment that we think the cross-examination can move along fairly quickly. You're investigating or exploring matters that we have raised ourselves yesterday. We understand where you're going and we urge you to move along.

MR. FREIDIN: All right.

MADAM CHAIR: And we would suggest to the witness as well that we give witnesses every benefit of

the doubt. When you need time to think of your response, please take that time; but, on the other hand, we don't want any stalling, and where you can give yes or no answers, that's what we want.

And we would like to move the proceedings along as quickly as we can today.

---Recess taken at 10:50 a.m.

---On resuming at 11:08 a.m.

MADAM CHAIR: Please be seated.

MR. FREIDIN: Q. Dr. Carr, I think what I'd like to do -- what was it that you were going to do again, you were going to look at the Soils of Canada and look at that luvisol issue. Did you have a chance to do that?

A. I have found the reference with regards to that.

Q. Let's go back to that and then we'll go back, I have a few questions about the last exhibit.

What was the number of this last exhibit, Madam Chair?

MR. MARTEL: 2057.

MR. FREIDIN: Q. Why don't you deal with that luvisol --

A. The question with regards to luvisols and the grouping that is there, that they tend -- that

they are formed by a wide variety of fine to medium textured soils but not often on coarse textured material. So it is a fine to medium textured material.

Q. Thank you. Now, if we could go to Exhibit 2057 I have just a few questions. Am I correct, sir, that the scale of this particular exhibit is at 1:7,500,000 as noted in the bottom righthand corner?

A. Yes, it is.

Q. And the area which for the purposes of this classification are subboreal--

A. The terminology is the subboreal spruce.

Q. Subboreal spruce?

A. Yes. That particular zone.

Q. All right. That corresponds fairly closely to the area that Roe has defined as Montane and subalpine?

A. In his grouping, yes.

Q. Now, I note that -- well, do you know why Roe -- are you able to determine why Roe's classification is different for that area than the classification in British Columbia?

A. There is not enough information to make a definitive statement, although I will give you

my opinion on that.

Q. Sure.

A. The classification with Roe is a very wide ranging lumping together of forest regions. The system in British Columbia of designating that as a biogeoclimatic subzone incorporates enough of the concept of ecosystem classification and for this they're just not the identical system.

For the subboreal spruce zone, with regards to the description presented in the book which -- that zone is described in more detail.

Q. Which zone are we referring to?

A. This is the subboreal spruce zone.

Q. Yes.

A. On page -- under the section that begins 2-10 -- at page 2-10, and if you would look under ecological conditions, second paragraph, the SBS which is the abbreviation, is part of the Canadian boreal forest region as defined in Krajina's 1965 work.

So the basis of my statement with regards to that being part of the boreal forest is based on Krajina's ecosystem, Krajina's work in 1965 not this particular document.

Q. Could you produce a copy of that work?

A. No, I cannot at this time.

Q. Are you familiar with that work?

A. Not to a great detail. I do not deal much with the issue of detailed ecosystem classification with regards to biogeoclimatic zones in British Columbia.

Q. Do you have an extra copy of the document that you are in fact quoting from?

A. I do not have an extra copy of it at this time. We can make available pages for you, say, after lunch, if you wish.

Q. I would appreciate that. Thank you.

A. Would you like --

Q. Give me this section that you're referring to. And I would like an undertaking, if possible, to provide a copy of the entire document.

MR. O'LEARY: If it's a document that's readily available.

THE WITNESS: It can be ordered from the BC Ministry of Forests. I do not know if there is a copy available at -- in this here -- I don't have any idea whether it is available in this area.

It can be ordered quite easily, and I suppose the Coalition can make a copy -- if you want me to provide it to you.

MR. O'LEARY: I'm happy to make it available for you, make a copy of it, if you like.

MADAM CHAIR: It's going to take you all lunch hour to make a copy of that.

MR. FREIDIN: Why don't you give it to us, we'll look at it over the lunch hour.

MR. O'LEARY: Fine.

MR. FREIDIN: That maybe the best way to do it. Who's Roe's -- it's been floating around here.

THE WITNESS: It's over there, sir.

MR. FREIDIN: Q. On page 7 of Forest Regions of Canada by Roe, the Montane Forest Region is in fact described, again we're talking the Montane is part of the area included in what, according to this FEC system, is described as subboreal.

Would you agree that it indicates that the characteristic tree species in that area is Douglas fir?

A. A minor point of clarification. The biogeoclimatic zone system is not directly comparable to the FEC system as far as classification is concerned, there is a slightly different basis as to the way they are used and way they were developed.

Q. Sure. But would you agree that in this area, according to Roe, the characteristic tree is

Douglas fir.

A. In the middle of the paragraph there are -- it states:

"The characteristic tree in the interior blue form of Douglas fir -- is the interior or blue form of Douglas fir. It is found throughout, but not particularly in the central and southern parts."

It goes on to speak of:

"...lodgepole pine, trembling aspen are generally present. Ingleman spruce, subalpine fir from which the subalpine forest regions together with western white birch become an important constituent of the exploitable forests."

Q. All right. So the three species there are Douglas fir, Ingleman spruce and subalpine fir, it's my information that those species don't occur anywhere in the boreal forest as defined by Roe?

Or putting it another way, let's forget where we can find it. Those species don't occur anywhere -- they don't occur as a general species in that area of green in Roe's map called the boreal generally? Are you familiar enough --

A. The boreal -- I'm just trying to

define using Roe's scale and the lumping together that he's done, there are mentions in here of balsam fir, but I don't see anything else, no.

Q. I think I'm almost finished with this subject matter, but I would like to -- there's a document called Utzig and Walmesly, it was made an exhibit I believe.

A. Yes.

Q. And the number was Exhibit 2046. 2046, Madam Chair.

Now, am I correct that this is the document, sort of the precursor, the background sort of work that went into the approach that you have testified to in British Columbia which involves these hazard keys and that sort of thing?

A. No, it's not.

Q. Where does this particular document fit into that particular scheme, if at all?

A. It's not part of the formal process, it did provide background information in regards to making the Interior Forest Harvesting Council aware of the scale and magnitude throughout the interior regions with which ground skidding exists and it tries to put in a broad sense some economic value, hopefully to drive the system, to understand the impacts.

Q. Right. We look at the heading, the topic is Evaluation of Soil Degradation as a Factor Affecting Forest Productivity in British Columbia, Problem Analysis, Phase I.

So really that's really what it talked about, but specifically in relation to this area that you just mentioned?

A. It is Phase I, yes.

Q. All right.

A. The specific terms are in there, in the document.

Q. And could you turn to page 13 of this document, sir.

A. I am there, sir.

Q. Page 13, the last full paragraph states:

"Two other aspects related to forestry in British Columbia should be recognized. First, BC is unique in Canada since it has the most diverse and complex land form and climate patterns. The Select Standing Senate Committee 1984 described BC as follows...", and I quote: "...the physiography of the province, coupled with the variations in the

climate, bestow upon British Columbia virtually all of the soil degradation problems found in the rest of the country and a few more besides."

Do you agree or disagree, sir, with the observations made by the authors of this document?

A. I do agree with the observations made by this document.

Q. And can you look at Exhibit 2056, sir.

A. Which document are we referring to?

Q. That is -- it's a document which was marked yesterday, the Distribution of Slopes in British Columbia.

A. Thank you. Yes, I do have it.

Q. This was a sudy done by the two named authors which attempted to, amongst other things, identify the slopes upon which harvesting activities occur in British Columbia; is that correct?

A. That's the attempt. There's no date or where it was published or whether it's been refereed, what review process, but that is what the paper is about, sir.

Q. All right. If you go to page 33, Table No. 5 headed Average Slope by Species Group and

Administrative Region, we have all of the regions that we reviewed earlier.

And do you have any basis on which to dispute their findings regarding the average slopes on which species are in fact harvested in the various regions we talked about or the calculation of their mean.

Just taking, for instance, Prince George, the mean slope for the harvesting of all the species indicated is 20.6 -- go across the page 21 -- sorry, not harvested, the presence of them, the presence, they appear on those slopes, the mean of 20.6, 21.0, and you go across the page.

Is there any basis on which to dispute their findings in that regard?

A. I have looked at the methodology they used, the lumping, the database, it is not -- it was an exercise.

If you would look on page 24, just to provide the limitations of this particular study, the database was from 1:50,000 national topographic survey series maps, so within the range that you could make assumptions at that scale, put it on computer models - which is what they have done - and lumped them together, that number is correct with regards to the

occurrence of species across that region, not as I presented earlier from the FRDA Report looking specifically at the timber harvesting activities within that region.

Q. If one wanted to determine where you would be harvesting those particular species, would you think that looking at whether the trees were mature or immature would be a pretty important factor?

In other words, let's say you said that certain species occurred on slopes, whether they would be harvested or not would probably depend on the age of them; it would be an important factor?

A. Yes, it would be an important factor.

Q. And Table No. 6, does it tell us anything about where the mature timber exists in those various regions, particularly in relation to the -- particularly of slopes upon which they appear?

A. With regards to the limitations of the database and the lumping involved and the broad classification, yes, it does say that the immature and mature from Prince George are 21.9 per cent average slope, and in the mature it's 20.4.

If you wish to look back on page 28, table 2 of the document, you can see the spread within the number of cells that were measured to ascertain

that mean.

Q. Well, if you look at region No. 17, which I understand is the interior, if you take a look at page 25, you have a map, 17 appears in sort of the middle of the map. Can we sort of -- that is the interior plateau?

A. That's the physiographic region, yes.

Q. Okay. So by physiographic region, the mean slope in that interior region is 15.6, do I read the table correctly? I have trouble with tables so that is why I'm asking you.

A. Under Prince George on Table 2 -- which table are you looking at?

Q. No, the entire region. For the entire region 17, if you go right across the page to the righthand column, do I read this correctly, it indicates that the average slope in that physiographic region is 15.6?

A. Across the entire physiographic region, yes.

Q. Right. And what we have across for each particular forest region are the averages.

A. The averages as derived by their modeling system.

Q. Yes, okay. If you turn to the first

page and look at the introduction where these two authors have stated:

"British Columbia is unique among Canadian provinces in its complex mixture of tree species, topography and climate...", and they make a reference to a number of authorities.

"These factors combine to produce a huge variation in opportunities for logging ranging from Douglas fir growing on easily accessible valley bottoms, to hemlock found on mountain sides so steep that helicopters are needed to harvest it. Slope emerges consistantly as a fundamental constraint in operability in British Columbia's forests by reducing productivity requiring more expensive logging systems, making road construction more difficult and increasing hauling costs."

Do you agree or disagree with the observations or conclusions which have been made by the authors in this paper?

MR. O'LEARY: You just read from a quote -- Madam Chair, he just read from a quote and the

question is with respect to the entire paper.

If there's two questions, perhaps Mr. Freidin could identify the second.

MR. FREIDIN: Well, the whole thing is; are these peoples' conclusions -- I will take them one at time.

Q. British Columbia is unique among Canadian provinces in its complex mixture of tree species, topography and climate; do you agree or disagree?

A. It's a well refereed article. I have nothing to -- my statement, I have nothing to say against that. I think it's quite appropriate. There's a lot of very hilly and a large area --

Q. What about the last sentence, do you agree or disagree with it?

A. I agree with the last sentence but I find the middle sentence very narrow in its perspective, that slope is primarily a limiting factor with regards to the coastal forest that he's describing with Douglas fir and hemlock or some of the interior wetlands.

It gives an indication there that they may be the dominant and, as I've stated, there's a wide range of areas in British Columbia not necessarily --

logging is not necessarily confined to Douglas fir or hemlock.

Q. Do you agree the keys just weren't developed for flat lands, gentle terrain; was it, the key that you've talked about that's been developed in British Columbia was developed for all of these slopes, all of these various slopes that are found?

A. The keys are applicable to all slopes, yes.

Q. I think you indicated that in terms of the history of this particular key it started back in the early 1980s when you were seeing people going straight up 45 degree slopes with Cats, and that was sort of thing that was alarming people. Isn't that what you said?

A. That is one of the driving forces behind the keys. The other was observations with regards to flatter areas where people could see visibly deep rutting and expansive landing construction.

Q. When you're talking about gentle rolling terrain, are you using the word gentle in the context or as defined in the keys?

A. In the keys we put specific slope classes in them.

Q. Is that the way you've used that word

in your evidence?

A. The slope breaks given in the keys that are now used to determine site sensitivity, they are to be applied on a cut block basis which can range anywhere from 50 to 200 to 250 hectares.

Within the context of a range we try to address consistent slopes as well as with the complexity factor on the one key, the self-displacement key, rolling terrain.

Q. I don't think you've answered my question. When you were talking about gentle rolling terrain or gentle terrain, either one, I assume when I listen to your evidence that you were using the word gentle as it in fact is defined for the purposes of the key that you gave evidence about. Yes or no?

It may be done on a cut block basis, that's fine, but is that what you meant by gentle?

A. Yes.

Q. Thank you. Could you then turn please to Tab No. 7 of the witness statement. Could you turn to page 12.

A. Which page, sir?

Q. Page 12. Do you have that?

A. Yes, I do.

Q. Take a look at the very bottom of

page 12 where it defines slope classes, it says gentle is less than 30 per cent; moderate 30 to 45 per cent; steep 46 to 60 per cent; and greater than 60 per cent very steep.

A. That was with reference to the use in the specific key.

Q. Right. Now, you referred the Board to the information that you in fact relied upon to make your comparison in relation to terrain earlier this morning.

Dr. Carr, are you able to provide the Board with any assistance as to what the various per cent slopes would be in Ontario -- in Ontario if one wanted to break up slope classes into the similar categories, gentle, moderate, steep, and very steep?

A. I'm not that familiar with the level of...

Q. You're not familiar.

A. I don't have enough evidence to do it.

Q. Okay. If I suggested to you, Dr. Carr, that a reasonable slope class in Ontario in the area of the undertaking would be: Gentle, 0 to 5 per cent; medium, 5 to 20 per cent -- or moderate; steep, 20 to 30 per cent; and very steep, greater than 30 per

cent, I take it based on your earlier answer you would have no basis on which to indicate whether that was accurate or not?

A. No, I don't.

Q. Would you agree with me, Dr. Carr, if those were the -- thank you.

Now, perhaps you can just keep the book open at Tab No. 7 because I want to ask you some questions about that.

I think we're sort of finished the area of examination, Madam Chair, dealing with similarity or non-similarity as the case may be.

I want to ask the witness some questions now about the particular site sensitivity rating system that is employed in British Columbia.

Would you turn to page 13 of that document.

A. Yes.

Q. There is a comment right at the very bottom of page 13 that indicates that:

"The potential impacts indicated for the above four sensitivity classes can be mitigated by thorough planning, appropriate logging system selection, and careful limitation of harvesting

practices."

I assume that you agree with that?

A. Yes, I do. That is the thrust of the second component.

Q. And that's a statement that applies to all four sensitivity ratings that you have: Gentle, moderate, steep and very steep?

A. Yes, it does.

Q. And that in fact operations take place on slopes of all those sensitivity classes in British Columbia. In other words, you can be over 60 per cent, there are still operations that occur?

A. Using careful planning and very sophisticated techniques, as long as there are no hazard with regards to, primarily at that stage, to mass wasting.

If it is still within the environmentally sensitive -- it is not within a categorized environmentally sensitive area, it has been viewed to be geotechnically stable, it can be operated on, yes.

Q. While we're on mass wasting for am moment, do you have any evidence whatsoever that mass wasting occurs in Ontario?

A. No, I don't.

Q. Does it occur usually in relation to

very steep slopes?

A. It occurs in what jurisdiction or mass wasting in general?

Q. I'm sorry, it occurs in...?

A. I'm wondering what jurisdiction you're addressing your question to.

Q. Well, in British Columbia.

A. We can have mass wasting on gentle to steep slopes. It's a matter of order of magnitude.

Q. Okay. Could you turn to page 12 of this document. Under the low degradation sensitivity rating it states in the first part:

"Sites that have low degradation sensitivity have low mass wasting and displacement hazards, and low or moderate surface erosion and compaction hazards. These sites tend to be on gentle to moderate slopes...', which would be 30 to 50 degrees.

You go on, you talk about some options, you say:

"Consequently, normal harvesting operations with few restrictions are appropriate."

Do you agree with that?

A. I agree with the statement there as long as I can provide to you what the purpose of this general description was, since this is a planning tool and was a training tool.

Q. These sensitivity ratings are based on a number of factors being considered together such as slope and soils.

A. The sensitivity ratings are based on a number of factors, yes.

Q. Including soils and slopes.

A. Including soils and slope.

Q. Would you agree or disagree, sir - because this may get right to the nub of this - that if, with few exceptions, the area of the undertaking is all in the low degradation sensitivity class, using this particular key, that the need for the sophisticated system that you have in British Columbia would be substantially different?

Do you understand my question?

A. Would you repeat it. I'm trying to frame the answer.

Q. I'm suggesting or putting the hypothetical to you that if, with few exceptions, the area of the undertaking fell within the low degradation sensitivity rating, there wouldn't be the same need,

the same urgency, the same sort of impetus for a system such as is developed in British Columbia?

A. The overall sensitivity degradational rating as described on page 12 ties back, as I mentioned yesterday, this is where they determine the acceptable limits for the amount of ground disturbance with regards to timber harvesting operations.

This is -- the descriptions are fairly generic, but if you had soils of low -- if all these came out to be low sensitivity with regards to the issues and the degree of productivity - this was developed with a full range of conditions in British Columbia in mind - then you would not -- if you felt that there was no significant -- if the soils were -- if the areas were low hazard, there would not be a need.

Q. Can we turn to page 23 of this particular document. I guess it's page 22 and 23 where we have a table entitled: Logging Strategies to Reduce Degradation.

MADAM CHAIR: What page are you on, Mr. Freidin?

MR. FREIDIN: 22 and 23.

MADAM CHAIR: Thank you.

MR. FREIDIN: Q. In the witness

statement it's combined, a little bit off centre, but do you have that? Do you have that, Dr. Carr?

A. Yes. Yes, I'm sorry, there was a shuffling.

Q. Now, you have to bear with me here, that is one of the -- I'm trying to interpret. We have slope on the lefthand side and we go down to the very bottom of the page, I guess three -- it says less than 30 per cent.

A. Yes.

Q. Does that mean, if I read that, that if you have slope of less than 30 per cent and you go across the page you're in a high hazard rating for displacement, your equipment is unrestricted and they give you certain logging method suggestions in the second last column; is that the way you read this?

A. No, this is an aid to the planners. It was put forth to assist the people developing the prescriptions.

In light of the fact that they would have to meet a guideline, we tried to provide some general information to assist them in the planning, and that is what this means.

These various combinations, this type of operation, yes, site degradation, strategy would help

you to keep the guidelines.

Q. Stay within the limits?

A. Yes.

Q. So if we go to the bottom of the page, for instance, then we're talking about slopes less than 30 per cent - and I choose that specifically because of my suggestion to you as to what the slopes in Ontario are - if you're in the medium and low hazard rating, let's go over to compaction which you talked about I think a lot.

As I read this key or this document it says, if you're in the medium or low hazard rating for compaction, the equipment that you can use is unrestricted, and they suggest that you have dispersed skidding to landings or roadsides and avoid periods of wet ground conditions.

I take it then that based on what you said, in those sorts of conditions, if you follow that sort of direction one would think you would be able generally to stay within the limits. That's the idea?

A. There are two components to that area, that bezel table. In presenting my evidence I've tried to always pertain, to bring it to this less than 30 per cent slope, you know, for you. There is moderate - I believe it's moderate and low, not medium

and low, sir.

Q. Sorry.

A. Moderate and low, and this is the hazard rating from the guide. There's two of them: One, you could have a high displacement rating associated with it, and the other a low -- moderate or low. I mean, these strategies were directed --

Q. Well, let's --

MR. O'LEARY: Well, let him --

MR. FREIDIN: No, no, just wait a minute, Mr. O'Leary.

MR. O'LEARY: Madam Chair, he's interrupting the witness before he responds.

MR. FREIDIN: I'm thinking it would be easier if we start with compaction where we are and explain this relationship; can we do that?

MR. O'LEARY: Madam Chair, with respect, the witness was in the middle of a response when Mr. Freidin broke in.

MR. FREIDIN: He's talking about displacement now and I want to talk about compaction.

MR. O'LEARY: He was explaining to you how the chart operates.

MR. FREIDIN: And I thought it would be easier if he dealt with compaction and stopped --

didn't change it to the subject matter of displacement, that's all.

MADAM CHAIR: Dr. Carr --

THE WITNESS: It is in the interpretation of this key are -- a prescription is a function of all four sensitivities across, we do not hold them out.

This general guide to prescription, the bottom one, deals with these type of hazard ratings for all four, you can't deal with them exclusively the way we have approached it.

The upper one, again, you have -- you cannot separate it out with this general planning guide, it is: If you had this combination --

MR. FREIDIN: Q. Which combination are we looking at again?

A. Any combination is the way it works. You could take the high, the one right next to the 30.

Q. Okay.

A. Or you could take the one at the bottom, both of those deal with moderate and low compaction hazards.

Q. Right.

A. So if you went across the top, if you felt that the sensitivity key determined that you had a high displacement hazard rating--

Q. Right.

A. --that would tend to supersede the moderate -- it would supersede, then you would look at dispersed ground skidding over snow-packed frozen ground or thick forest floor.

Basically we're identifying that if you have that type of situation, you would want to use the buffering capability.

Q. What you're saying is, if in fact across the table you've got a high in one, a moderate and low in another one, you always go to the highest one to figure out what your logging method ought to be?

A. You measure around the highest constraint, particularly in regards, if it is the highest hazard, it determines the overall rating in regards to site compliance. There's two components.

Q. All right. Let's go back to the bottom of the page where we started and, as I read it then, if you have medium and low -- moderate, pardon me, and low sensitivity to displacement, mass wasting and compaction, you are unrestricted equipment and dispersed skidding to landings or roadside?

A. That would generally meet the guidelines.

Q. And if you go to the next page where

there is footnotes, equipment unrestricted, Item No. 12 --

MR. MARTEL: What page are we on, Mr. Freidin?

MR. FREIDIN: Turning to page No. 24.

Q. I'm just trying to clarify what unrestricted equipment means. It means, typically feller buncher and grapple skidder, however, equipment that causes less disturbance may be a viable option. That is the general direction or option?

A. That's the general direction, yes.

Q. If we go up to (b) -- pardon me, if you go up one, the second last one, where you've got moderate and low displacement sensitivity, moderate and low for erosion -- pardon me let's go back.

Moderate and low for displacement, moderate and low for mass wasting, all for erosion -- what does that mean 'all for erosion'?

A. Any erosion hazard.

Q. All right and. High and very high for compaction, the equipment restrictions are LGP which is low ground pressure?

A. Yes, it is.

Q. Or unrestricted as we just discussed it?

A. Yes.

Q. And the direction is dispersed skidding over snow-packed frozen ground or thick forest floor to landing or roadside?

A. That was directed to the unrestricted, the LGP, it's bracketed, that -- you sort of move up a little bit and use designated skid roads or skid trail network.

Q. Okay.

MADAM CHAIR: One moment, Dr. Carr. Before your field guide was developed -- implemented, was it the case in British Columbia that there were no restrictions whatsoever on logging equipment or no designation of skid roads and trail networks?

THE WITNESS: Even this guideline does not put restrictions on equipment. These are suggested strategies for the system planner to meet the guide -- you know, this is sort of to help them meet the guidelines. There were -- it depends what you call restrictions.

MADAM CHAIR: Well --

THE WITNESS: There were a similar set of recommendations and descriptions with regards to the equipment suggesting in general guideline form, keep the -- you know, stay off the wet ground, you know, a

number of very broad things, but there was nothing that would say, you could not on any case take that piece of equipment on a specific ground. Just very general guidelines that exist and still exist with regards to the recommendation of equipment.

This type of strategy was directed at trying to facilitate meeting the guidelines.

MR. MARTEL: Can I ask a question because I want to be clear about something. Did you in answer to a question to Mr. Freidin, just before he got to looking at this chart, I think he said to you, if most of the area were low - and that is below 30 or 35 - that the need for a sensitivity rating system wouldn't be as necessary.

I think you responded, there were not be nearly the demand for this process. Am I right?

THE WITNESS: You misinterpreted a little bit. The question was, if most of the area were of low hazard.

MR. MARTEL: Right.

THE WITNESS: Not slope, you can have --

MR. MARTEL: No, I didn't say slope, I don't think. If I did, I apologize. I meant hazard.

THE WITNESS: You said low and then you went less than 30.

MR. MARTEL: Yes.

THE WITNESS: But you can get a high hazard on less than 30 as well. It relates to your soil compaction sensitivity.

The ecosystem guide, field interpretations has a soil condition influence, they have a compaction rating key on page -- I refer back to the silvicultural interpretations, FEC Manual, 3.21, they have a soil conditions influencing soil compaction, compelling and hazard rating, and they have a rating system for that has low, moderate, high, so that they have -- a relatively similar system does exist as far as giving the rating.

MR. FREIDIN: Q. Let me go on and see if I can clarify this. The sensitivity rating is low -- degradation sensitivity, you have low degradation sensitivity - I'm going back to page 12 - you have moderate degradation sensitivity, high degradation sensitivity, and very high degradation sensitivity.

A. Yes.

Q. Now, at the bottom of the page on page 12 we went through slope classes which were defined as gentle, moderate, steep and very steep.

Now, first of all, the slope classes and the -- whether you're in a low, moderate, high, or very

high sensitivity class are two different things; is that correct?

A. The overall rating, which you are reading on that page, refers to the overall sensitivity rating with regards to the standard set.

It does not mean, particularly with compaction, that you do not have a high or very high hazard rating, that's minus a class with regards to the standards to try to facilitate, you know, that later position.

Q. Right. I want to try to clarify this, I want to make sure that Mr. Martel -- well, I understand this.

The fact that you are in a low slope class does not necessarily mean you will be in a low degradation sensitivity class; is that correct?

A. Yes.

Q. And the table that we were looking at on page 22 and 23 that told you or gave you guidance as to whether there were equipment restrictions or how you should go perhaps about logging, were based on what the sensitivity rating was going to be for each of the hazards referred to?

A. The sensitivity was to try to separate the sensitivity hazard with regards to the

process. The hazard, you can have a soil compaction hazard of very high on flat ground.

Q. Yes.

A. With regards to giving it the rating to meet the standards, the regulations, you would use that -- say, it was a high, you would subtract 1,000, then that would set the standard.

Q. All right. But it's the sensitivity rating, whether it's adjusted by a class or not, it's the sensitivity rating which dictates what guidance is given in relation to equipment and logging method?

A. Yes, it is. In light of the overall rating from that page, it's the highest - at the top - it's the highest of the -- which of your four processes that dictates the constraining issue which you try to manage around.

Q. All right. And one of the factors that you use to determine the hazard rating, one of the factors that you look at coming up with the hazard rating for any particular site is the slope?

A. It does not come into play in the soil compaction hazard key.

Q. Okay.

A. That's based on soil texture.

Q. So putting the question again: If,

with some exceptions -- with few exceptions, the sensitivity rating in the area of the undertaking fell within the low degradation sensitivity rating, would you agree that there would not be the same urgency or need for a system similar to the one which has been implemented in British Columbia?

A. If you could make and substantiate the evidence or the statement that you do not have any of the moderate or high or very high sensitivities which would be reflecting your soil compaction, if you had no soil compaction hazard and that was also low, with regards to the way it's framed in British Columbia, you would not need this system.

Q. Okay. Now, if we go back to page No. 12, go back to page No. 12, and it says under low degradation sensitivity:

"Sites that have low degradation sensitivity have low mass wasting and displacement hazards and low or moderate surface erosion and compaction hazards."

A. That's true.

Q. All right. Now, if in fact you fell within the low degradation sensitivity as indicated there, would your statement still hold that it would not be as necessary to have -- or wouldn't be necessary

to have the British Columbia system in place in Ontario?

A. The sensitivity ratings that are on page 12 refer specifically to guidelines that are established in British Columbia, and were we to have area like that we would think that there would be fairly easy capability, but there would still have to be, we feel even on the low sites there are restrictions put on them to stop excessive abuse of the ecosystem.

Q. Right. That's the sort of thing, making sure they don't go on some of these areas which are very sensitive, like clay in the summer, unless you've got high flotation tires, going on those areas in the frozen season, that sort of thing?

A. (nodding affirmatively)

Q. Yes?

A. Yes.

Q. Yes, thank you. Now, if we go back to page No. 23, when we were looking at the second situation, second from the bottom of the page, where it indicated with those particular hazard types and ratings that you would have low ground pressure -- would you turn to 24, let's see whether we can get a little better idea of what that means.

You see in Item No. 11 on the footnote that LGP means low ground pressure machines; i.e., nominal ground pressure less than 43.4 kilopascals, converted into 6.3 pounds per square inch. So that's the meaning of LGP when we see it in the equipment column; is that correct?

A. That is what was intended, yes.

Q. Now, I take it because you -- well, based on your evidence you really don't know the degree to which any of those particular equipment methods are used or logging methods are employed, if you sort of -- all right.

I'm suggesting to you that the equipment, restrictions and the kind of logging methods suggested, in fact, are employed in Ontario in situations similar to those identified in the hazard ratings, that when you have those hazard ratings you generally have those kind of equipment, restrictions and logging practices.

Are you in any position to say that's not the case?

A. No, I'm not.

Q. And I gave you yesterday the Silvicultural Guide for the Spruce Working Group in Ontario.

A. Yes, you did.

Q. Now, would you -- have you got that in front of you.

MR. FREIDIN: I've got some excerpts here, you may have not have brought yours, Madam Chair. I don't think this has to be marked as a separate exhibit, it's an excerpt of pages from 382.

I would like to turn to page number -- it's the second last page of the document that I gave you, Madam Chair, it's a page from Table 5 in Exhibit 382, it's on page -- there is no page, it's an appendix to that particular exhibit.

Q. Appendix A, Table No. 5, this is part of a silvicultural ground rule table, Dr. Carr. It's one where the site type in this particular case is an organic soil with more than 40 centimetres of organic over mineral soil, poorly to very poorly drained.

This is an area identified, it comes out of the Clay Belt which is that area which we identified as C2, that general category.

There is indicated here in terms of the fifth column, preferred season of harvest, and would you agree with me that there is reference to using low ground pressure machinery and, in fact, the number of kilopascals of ground pressure which is referred to -- is also referred to?

A. Yes, that's there.

Q. All right. Now, that particular -- I asked you a question about this silvicultural guide, I gave it to you last night because you made reference to the site prep silvicultural guide in British Columbia, and I wanted you to tell me whether they are a similar kinds of documents or whether they're different.

Were you able to come to any general view on that last night?

A. I reviewed the document quite extensively and there are a number of issues in there with which I have regards to specifics and to the overall nature of the document.

Q. All right. What I'm really interested in is, how in your view do the general nature of the documents compare.

This document I'm familiar with, it deals with this particular species, talks about the kinds of different soils that it can appear on, talks about how weather and operating conditions can affect the site, and gives guidance as to the sorts of mitigating measures that could be taken.

The Guide to the Use of Mechanical Site Preparation Equipment - I just looked at it briefly - seems to be a document which identifies how you go

about operating various kinds of equipment, site preparation equipment, and does it give guidance as to the precautions one should take in relation to various kinds of soils or site conditions?

A. That particular document is only one of a number of system planning tool documents. More specifically with the issue, the definition printed in Table 5, that information is included in the silvicultural interpretations with regards to the ecosystem classification and there is a table that is relative, relatively close and just giving general guidance, yes.

Q. Thank you.

MADAM CHAIR: Time for lunch, Mr. Freidin.

MR. FREIDIN: Yes. I should point out --

MADAM CHAIR: Is this a good place to stop?

MR. FREIDIN: Yes, it is. Thank you.

MADAM CHAIR: All right. We will take our lunch break now.

---Luncheon recess at 12:10 p.m.

---On resuming at 1:35 p.m.

MADAM CHAIR: Please be seated.

Mr. Freidin, Mr. Pascoe has reminded me

that we received a letter that we would like to make an exhibit and the letter is from the Canadian Botanical Association. It is dated January 8, 1992 and is signed by the president of the association Mr. Paul Catling, that is spelled C-a-t-l-i-n-g, and it is a one-page letter. Copies are available for the parties and this will be Exhibit 2058.

---EXHIBIT NO. 2058: One-page letter from the Canadian Botanical Association, dated January 8, 1992 signed by the president, Mr. Paul Catling.

MR. FREIDIN: Q. Dr. Carr, could you turn to Tab 8, please, page 5. This is the Site Preparation Strategies--

A. Yes.

Q. --to Management Soil Disturbance?

A. Yes.

Q. On page 5, under the heading Interim Site Preparation Strategies to Manage Soil Disturbance it states:

"The strategies presented in this section should not be relied on to replace local experience. Several other options exist such as raw planting through slash, planting large crops on brush filled sites or using domestic livestock to

control vegetation."

Is that a general direction that you agree with?

A. Yes, it is a general direction I agree with.

Q. Why do you agree with it?

A. The purpose -- I agree with this, based on my understanding of the purpose of the document which I had nothing to -- that I had no input into this document.

Q. Right.

A. That this document as even the initial thrust of the previous -- the one under Tab 8 for planning -- that's...

Q. Under Tab 7 you mean?

A. Tab 7, I'm sorry.

Q. Dealing with harvesting?

A. Harvesting. Are developed and were presented as planning assisting guidelines and that is what this applies to and I see no problem with what they state.

Q. I take it then that you -- if we turn to Tab No. 5, page No. 2, Arabic No. 2, these are the ground skidding guidelines?

A. Yes, these are the ground skidding

guidelines released by the Ministry of Forests. Arabic what page?

Q. Page 2. Do you have that?

A. Yes, I have it.

Q. In the second full paragraph on that page it states:

"The procedures and guidelines presented in this handbook are intended for use by personnel engaged in the planning, implemenating and controlling of ground skidding operations. This handbook does not present rigid directive to the resource manager, but is a suggested set guidelines that recognizes difficulties which the great variety of conditions affecting the application of harvesting principles may cause."

Do you agree with that statement?

A. My copy doesn't have that page.

MR. O'LEARY: No, it's the regular No. two.

MR. FREIDIN: Regular No. 2.

THE WITNESS: I'm sorry.

MR. O'LEARY: It was a trick question.

THE WITNESS: I do apologize. It was a

late night to go through your information.

MR. FREIDIN: Q. I am not going to read it again out loud. Take a look at that second full paragraph which begins with "Procedures and guidelines..." and tell me whether you agree that that is a good instruction to have in the circumstances which are being addressed?

A. That gives the direction and to the purpose of when this document was written and what they wanted it to be used for.

Q. Is this document still in effect?

A. It still exists and it's out there, but I don't believe -- most people now refer to the replacement documents which are tied closer to the field guide with timber harvesting that I developed and there are two subsequent land management reports that provide the basis.

One of them is 63 and there is a larger version which will be 62. I do have a draft about **yay thick, but the final publication is coming out. That will probably supplant a great deal of this information.

Q. Do you agree that regardless of the form that these things come out that they really are what this document indicates and that is, a set of

guidelines that do not present rigid directives and, in fact, that's the case because of the great variety of conditions which can affect the application of harvesting?

A. Yes, I do.

Q. Thank you.

A. I think that's sufficient.

Q. Now, I want to ask you a little bit about an issue which is raised in your witness statement. Could you turn to page No. -- it is answer No. 53 in your witness statement. You will find that at page No. 30.

A. I'm there.

Q. Now, question 53 deals with the sampling procedures in relation to this sort of a system. You make reference to the United States Forest Service Region No. 6. I understand that that's the Pacific northwest, Washington, Oregon?

A. Yes, it is.

Q. You make the comment in the first paragraph:

"In that system the presence and degree of compaction can be assessed by soil core sampling, air permeability..." and other specified means.

You refer in the next paragraph to your Tab No. 6 and you say then:

"This system..." you are referring to the B.C. system,

"...was modified to accommodate the qualitative approach of assessing soil degradation by disturbance type used in B.C. This is the type of system I would recommend."

Now, would you please explain to me the difference -- well, first of all, you say the type of system you would recommend which the qualitative approach which is used in Tab No. 6; is that right?

A. That's the approach in No. 6, yes.

Q. Okay. That's the approach that you are saying that you would recommend given a choice between the United States procedures and Tab 6?

A. Yes, it is.

Q. Could you turn to the Ministry of Natural Resources's Interrogatory No. 16(a). Keep your witness statement open at that page. It is part of Exhibit 2043.

MR. O'LEARY: Which question?

MR. FREIDIN: 16(a).

THE WITNESS: This beings with page 30

and subsequent?

MR. FREIDIN: Yes.

MADAM CHAIR: What question was that, Mr. Freidin?

MR. FREIDIN: It is question 16. You will find that on page 10 of Exhibit 2043.

Q. Do you have that document as well, Dr. Carr? These are the interrogatories.

A. Yes, I have that here.

Q. You have page 10?

A. Yes, I have page 10.

Q. You will find question 16 a quarter of the way down the page referring to page 30, answer 52 and 53?

A. Yes.

Q. You will notice that there is reference on page 10 at the beginning of the question, at leastit is a reproduction of terms and conditions, two of them, 195 and 196 being proposed by the Coalition.

In question (a) we said:

"Please identify all the differences between the proposed terms and conditions and the methodology system in measuring soil disturbance following timber

harvesting..." which is your Tab 6 which you said you preferred over the American one?

A. Yes.

Q. In the answer which you find on page 11, you say:

"The survey system currently used in British Columbia relies on the identification of specific soil disturbance classes to indicate site degradation. It is an inferential method that lends itself to rapid field assessment. The determination of field bulk density is a system that is more parallel to that used in the United States Forest Service."

Now, I read your witness statement where you say you would prefer or recommend your qualitative approach, I have read terms and conditions of the OFAH which, in fact, specifically require bulk density testing and then I read your answer in which basically you say you prefer the inferential method which is yours and you compare that to the determination of field bulk density like they do in the United States and I came to the conclusion that really you don't support a system or would not recommend a system, for

British Columbia anyway, where you went out and had to do bulk density testing, that you would recommend the inferential or qualitative approach referred to in answer 53?

MR. O'LEARY: I can assist in some record regard, Madam Chair. This is one of those terms and conditions that will be amended. As I indicated to you, as a result of our dealings with Dr. Carr the Coalition has felt it appropriate in light of his information and assistance to amend it.

MR. FREIDIN: Q. Tell me, Dr. Carr, why you -- well, I haven't got the amendment. Do you have the amendment here now?

MR. O'LEARY: No, I don't. I just thought I would alert you of it. It is not going to be a contradiction if that's the point you are getting at.

MR. FREIDIN: All right. Can you advise me, is the requirement for the bulk density testing going to be deleted?

MR. O'LEARY: I haven't seen the final wording.

MR. FREIDIN: Mr. Hanna is saying yes.

MR. O'LEARY: Mr. Hanna is shaking his head yes.

MR. FREIDIN: Q. Do you have any idea,

Dr. Carr, as to what the bulk density limits are going to be replaced with?

The only reason I am asking these questions is Dr. Carr won't be here. There may be not another witness that can question on the amendment. I may have problems with the amendment as well.

MADAM CHAIR: You are asking Dr. Carr what the Coalition is going to do with respect to the term and condition?

MR. FREIDIN: Q. You don't know that, do you?

A. I don't know that.

MR. FREIDIN: Can I just have a minute.

MR. O'LEARY: Madam Chair, Mr. Hanna has indicated he might be able to be of some assistance in advising Mr. Freidin of what the Coalition is proposing to do in relation to that.

MR. FREIDIN: That would be helpful.

MADAM CHAIR: Would that be helpful?

MR. FREIDIN: Yes.

MADAM CHAIR: Go ahead, Mr. Hanna.

MR. HANNA: Madam Chair, it is our proposal to -- and of course any specific wording has not been worked out, but the proposal will be similar to what has been described by Dr. Carr that has been

developed for B.C.

It will involve establishing maximum levels of site disturbance or site degradation that will be applied on a site sensitivity basis. We have discussed with Dr. Carr the sampling procedure that he has developed in B.C. both to predict site degradation and to monitor it after the fact and that we would propose that a system comparable be developed for Ontario.

As Dr. Carr has suggested, there may be changes in the classes and some of the interpretation, but the framework that he has set out would be what we would be proposing to apply in Ontario and we will coming before the Board -- at least I am anticipating we will be coming before the Board and asking the Board to include in their decision maximum levels of site degradation that can be used as objectives and points of measurement in terms of compliance in future timber management plans. That compliance would be followed through in the way that Dr. Carr has described would be set -- has been set out in B.C.

It is our intention, Madam Chair, to provide the details of that in Panel 9 and the reason we are providing it there is the major thrust of the evidence at that point will not be the technical part

which Dr. Carr is dealing with, but will be the administrative side in terms of how does he integrate a planning system and how can we make it operable and practical in Ontario.

MR. FREIDIN: Can I take it that the sort of sampling procedure or the monitoring procedure will be consistent then with the evidence in one of the tabs here or the evidence he has been given in relation to monitoring so far?

MR. HANNA: Certainly based upon your discussions with Dr. Carr it seems like a workable system, one that has been tested and tried and we are certainly interested in exploring that and we would be happy to discuss it with the Ministry at any time, but it is something along those lines.

MR. FREIDIN: Okay. I can understand why you might not be able to say anything more than something along these lines. That's fine. I think I can move on, Madam Chair.

Q. This was the monitoring survey, by the way, that I think you said was to go out on a cut block that you wanted to look at would be $500?

A. The development and the number of systems that we looked at one of the key issues was to have a system that was statistically valid, repeatable

and cost effective.

Personally having done many, I have used several different methods in trying to measure disturbance. When we did a direct test on a block and running several different systems this one came out to be very expedient, required very little training and as such the amount of time required, as I mentioned yesterday, was directed towards two men and a half day to perform the survey on a cut block of between generally 50 hectares. The larger the cut block slightly increased and then subsequent from that the cost I gave was based on two men, you know, effectively two technician days.

Q. Did you say the other day that the inspections or these inspections could be done by the industry or Ministry staff?

A. From a compliance standpoint, if a block is selected to be surveyed, and not all blocks are surveyed, there would be a reason to go in and somebody would challenge whether or not there was a problem.

It would be an independent silvicultural contractor who has taken the thing and then with regards to cost it's sort of the winner -- Loser pays.

Q. Loser pays. Do you have any estimate

of what -- how long has this system been in place in British Columbia?

A. Three years.

Q. Do you have any idea of the costs for these particular inspections which will be incurred right across the board?

How much does it cost to the industry and to the ministry to implement the system, do you know? You may not and that's fine.

A. I really couldn't guess how much it is.

MR. O'LEARY: Madam Chair, he did give evidence on that point yesterday as to the cost of an individual survey.

MR. FREIDIN: No, I am not talking about individual.

Q. I guess to know how much it would cost overall you would have to know the number of cut blocks which were actually investigated and multiply it by five hundred?

A. Pretty much. The survey to date has been done under -- there are a number of ongoing studies and the compilation of the -- I believe it now in excess of 200 blocks just within the research framework of just going out and validating the system.

Very few that I know have -- there is yet to be very many compliance level surveys ordered to be undertaken.

Q. Why? It is either compliance or they haven't got around to that part of the program yet?

A. There is a fine point as to when did the block come under compliance and when the final numbers come down.

Q. So is it fair to say that the program is relatively new and it hasn't been developed long enough and been in place long enough to get any real good sense of what it is going to cost on a sort of regular basis?

A. Not on a provincial-wide basis.

Q. Okay, thank you.

In term and condition No. 196 - Mr. Hanna, maybe you can help me here -- first of all, Dr. Carr, the last sentence of 196 says:

"Sampling shall be carried out on all areas harvested, including all tertiary roads and any secondary roads designated for regeneration."

As I understand your evidence, the samping which takes place in British Columbia or which is intended to take place would be on those blocks which through some mechanism, through observation or

whatever, were suspected of being beyond the standard; is that right?

A. There will be two ways. One precisely what you describe as some mechanism. There has recently in the past year been a change of sort of direction within the Ministry of Forests to undertake a standard auditing procedure across a certain percentage of blocks of a given operator. Like, it may be 5 per cent of all the blocks that the company has.

Q. Sure.

A. This will be a standard part of that survey which would include wood waste and a number of issues.

Q. I guess what I would just like is some clarification on, when I read 196 it says:

"Sampling shall be carried out on all areas harvested..."

Will the redrafted term and condition have a requirement that sampling take place on every block harvested or will it say that there should be a sampling as described by Dr. Carr of various areas harvested?

MR. O'LEARY: We haven't quite decided from the Coalition's point of view as to extent that that provision will be amended.

MR. FREIDIN: Q. Dr. Carr, I take it that you feel that the approach being developed in British Columbia in terms of sampling and the method you have described is a reasonable one. Is that true?

A. Yes.

Q. And, therefore, if in fact the Board saw fit to impose a similar system of monitoring for soil degradation that you feel that if we took your approach to sampling that that would be a reasonable part of any such system?

A. I think that would be a reasonable part of the system.

Q. Thank you. Now, could you turn to Tab No. 9, please, of the witness statement. This is the section which -- the tab that provided the 1989/90 results of the provincial soil disturbance summary.

It is this document that refers to the range of disturbance in -- if you turn to page No. 1, item No. 1, it refers to the range of soil disturbance and I think we mean here now detrimental soil disturbance; is that correct?

A. It's the range of those areas that are counted towards compliance or not.

Q. All right. We are not talking about the area which is where you have soil disturbance, it

is where you have soil disturbnace which is detrimental that is being used or being added up here?

A. By the definitions within the guidelines, yes.

Q. The definition we find in the second last -- second paragraph on page 2, right at the end in bold:

"In this report detrimental disturbance refers to the sum of skidding and landing disturbance as this term is currently defined in the Ministry of Forests' interim harvesting guidelines?

A. That is correct.

Q. And we find that would be roads, skids roads and heavily impacted skids trails?

A. Yes.

Q. Okay. Now, am I correct that the range which is reported here, in fact, is a range which was calculated based upon all of the forest regions of British Columbia which were examined?

A. The range reported here is based on the information. There were a number of studies. This is a preliminary assessment and the final -- they are going through to take a better look not only of this, but other data.

The reason for the very wide range sometimes is that there was no criteria in the initial grouping of this survey as to what type of block you are going on and in some districts when they were given the directive to go out and survey 15 or 20 cut blocks there were several districts that went out and found the worst thing they could find to measure. They wanted to know how bad it was. Other districts went out to what they felt were the normal operations.

So this particular data set has a combination of really good and really bad and they're trying now to pull out of this and even more recent survey information of what is a more accurate estimate with regards to sort of good, normal logging operations.

Q. Okay. They looked at -- if we can turn to page No. 5, we really have in each little section of that Table No. 1 the various regions from which results were obtained?

A. Yes.

Q. We have reviewed earlier today where those regions were in a very general way.

If we go to Table No. 2, as I read that table, in the results that were used for the purpose of tabulating the range it included the Nelson Forest

region which is the third region on the left-hand side of table No. 2 and in that particular region they looked at -- or included not only random or I guess detrimental disturbance on random skid trails, but also on constructed skids roads. Is that true?

A. All of them have that. It has to do with the definitions that refer back. A constructed skid road we view as a bladed structure out into the block. The random skidding or the skid road is predominantly a non-bladed structure where you just have traffic.

Q. So we used -- at least for Nelson region they included when they went out and did their calculations and reported back to whoever was compiling all this stuff, they didn't just look at random skidding, they looked at disturbance which was created as a result of the construction of skid roads?

A. That is in all the surveys.

Q. All right. That's in all the surveys?

A. Yes.

Q. Does that mean that there were no detrimental disturbance -- I can tell you from where I am coming from, Dr. Carr. I suggest to you that by definition you cannot build a skid road without having

detrimental soil disturbance?

A. It is implicit in the definition of the terms.

Q. Right. So when we look at Table No. 2 and we have the zeros under the heading Constructed, and constructed means -- all right.

We have zeros for all the regions except for Nelson and I read that as saying Caribou, Kamloops, Prince George and Prince Rupert, they didn't look at skid roads or report skid roads at all, but Nelson region did; am I right?

A. I don't know the rationale behind the tabulation here. This is a summary report that I supplied to try to give some assistance to you.

Q. All right. Let's move on then from -- pardon me, Nelson region, if we go back to Table No. 1, has got slopes up to a maximum of 63 per cent; is that right?

A. Table No. 1?

Q. Table No. 1. Just one page over to the left, second part. The slopes in Nelson region where you have got those skid roads reported the maximum slope is 63 per cent?

A. It's definitely there.

Q. Right. And the mean is 28.6?

A. Yes.

Q. Okay. Could you just go back to the text of this report, back to page No. 2 -- sorry, go right back to page No. 1 under the heading Highlights.

A. I'm there.

Q. It says in No. 4 there was a poor correlation between overall hazard rating and detrimental disturbance levels.

"This suggests that current operating practices are not being adapted to site specific hazard ratings."

Could it also equally indicate perhaps that people were not following -- pardon me, that the guide was wrong, the key was wrong? It can mean that as well?

You suggested that there was a poor correlation because -- and that suggested that practices weren't being adapted to the ratings. Could it be possible that the hazard ratings were out?

A. Although this is a summary, that could be an interpretation.

Q. All right. Can we go over to page 2 under the heading Survey Results, come down under the heading Detrimental Disturbance Levels and the second bullet states that:

"Slope steepness and skidding system were the factors most correlated with the level of detrimental disturbance."

Is that something that you would expect?

A. Yes, it is.

Q. So there was a -- can you turn to Tab 5, please, page 46. You find there a skid road cross-section?

A. This is an example of a skid road cross-section.

Q. Just so we don't lose sight of what a skid road is defined as, it is defined as a road -- skid roads are bladed usually with no stumps on the running surface?

A. Yes.

Q. Now, I note that in this particular cross-section, if you look at the left-hand side it has got a slope coming in from the left, that's been cut into I guess with some sort of equipment to provide a running surface and then there is a slope going down to the right. If I can just...

It looks like this. (indicating) You have got that part coming in like this, you have got the road surface and then you have got it going down like that. Is that basically what it shows there?

A. It shows an example of a skid road construction on a steep slope.

Q. So skid roads are a frequent type of -- they appear frequently on steep slopes?

A. Yes, they do.

Q. What that shows is you have got this slope here coming in from the left, in fact is the slope of a mountain or whatever it is, you have to cut into that to give you the running surface and the part down here is in fact where the slope continues; is that right?

A. Yes, the slope you have -- within a rough range, yes.

Q. Okay. When you go up a slope, they don't build these roads straight up. I guess they go back and forth and they build what they call switchbacks?

A. I have seen some of the wildest varieties of skid roads constructed on steep slopes that you can imagine. Quite often they are not switchbacks.

Q. What are they?

A. It would be very difficult to describe, except sometimes it is shocking when they are using this type of logging operation on steep slopes

which was really one of things we wanted to eliminate directly through the guideline.

Q. All right.

A. I can show you one of the more intriguing patterns.

Q. Well, let's start this way. Is the switchback configuration, assuming the roads are properly constructed, the proper way to get up the slope?

A. In regards to the use of ground base logging system, skidding on steeper slopes where you are going starting to get a lot of gouging, the proper way would be to not even build them.

There is no way that that system can come even near compliance under the current standard. There is no right way to catalogue a 60 per cent slope and come in under the guideline.

Q. Let me put it this way. Would you agree that the skid road built in this sort of configuration is only something which you use on steep slopes? You don't do it where you have got relatively flat terrain?

A. They are of a much smaller width and smaller cut of height. If you would like to look at the field tab -- the guide, there is a picture denoting

the width of disturbance relating to slope and the size of the equipment that relates specifically to what you are getting at.

Q. I think you are going to get into a little more detail than I want, but show me where that is.

A. It is a very simplistic guide. It is just to give an indication when we are giving this in a workshop of the type of issue that you're dealing. It would be this one, this effective cut height.

Q. Tab No. 7, page No. 6.

A. Yes, page No. 6. Here we are looking at these being constructed by either D4 or D6 and it gives you an indication of the cut height and that subsequently tells you how wide the disturbance is.

So if you have a shallow one, the amount of disturbance is -- the width of the disturbance is smaller.

Q. All right, I accept that. In the diagram, if you back to page 43 at Tab 5, when you build this road on the slope you side pack the material that you cut out of the slope and you put it on the down slope; isn't that right? That's what it shows there and that's the common procedure?

A. Yes, it is.

Q. Now, I suggest to you, sir, that when you go to British Columbia or to any area where you are doing steep slopes work and you are building skid roads, No. 1, you are cutting into the side of the slope and you are exposing mineral soil, right?

A. That's correct.

Q. You are throwing all of it, the fill and stuff you cut on the side of the slope; is that right?

A. Yes, you are.

Q. And when it rains, where does all that fill go? It runs down the side of the hill and you have got erosion to beat the band; isn't that right?

A. I can show you graphic pictures.

Q. Very graphic pictures. In fact, that is the sort of condition that I would suggest to you is existing in areas with high slopes where you have got to build those kinds of skid roads to in fact get the logs out and it doesn't happen in areas where you don't have the steep slopes? Are you able to comment?

A. There is skid road construction that we find on virtually flat ground, very gentle terrain where they have bladed a surface cut, but the width of the disturbance is only the width of the tractor blade

and there's very small slough, but they do construct them. There is less of them. There tends to be more of the random dispersed skidding across the block.

Q. Right. But the potential for erosion and, therefore, sedimentation which exists in B.C. and which had existed and gave rise to the great amount of concern, would you agree, sir, was the result of roads having to be built on slopes like that and, as you suggested, situations where they were disasterous, they weren't probably -- I took from your evidence they weren't probably constructed at all?

A. I would like you to focus your question a little bit more.

Q. All right. Would you agree that as a result of the exposure of mineral soil and the side casting of cut material on the slope gave rise to the erosion problems which one hears about occurring in British Columbia?

A. That sequence was and still is very important in the steeper areas, although on some of thetje gentler areas, the flatter terrain up in the Prince George region where they can have 3, 4, or 5 per cent grade on the skid road, the concentrated flow within that area on very erodible soils can result in some significant impact.

Q. All right, that's fine. It is an impact that wouldn't be created by random skidding which did not involve blading or exposing mineral soil, would it?

A. No, it wouldn't.

Q. Thank you.

Q. A few questions about rehabilitation, Dr. Carr.

If I could just have one moment, Madam Chair. You will probably be happy because I lost some of my questions.

MADAM CHAIR: Are you finished, Mr. Freidin?

MR. FREIDIN: No, I'm not. Sorry, Madam Chair, I found them.

Q. The rehabilitation that you have spoken about. When somebody doesn't meet the standard which is in your interim harvesting guidelines, the 19 per cent, say, for a low or moderate sensitive site, is there a legal requirement that it be rehabiliated at the present time?

A. You are talking about rehabilitation specifically within terms of the standards or rehabilitation that is normally required under the cutting permit?

Q. All right. Let's --

A. There are two types.

Q. Answer both. Let's take the guidelines first.

A. That will be a legal requirement as part of the penalty mechanism when it is finalized.

Q. It hasn't been finalized yet?

A. No, the penalty has not been finalized.

Q. I know we are speaking hypothetically here, but a lot of this about what's going to happen with these guidelines perhaps is.

Is it going to be a requirement that you do the whole thing or just do enough to get you down to the 19 per cent?

A. With regard to the compliance component, and I would like to make a reference in a moment to the standard type rehabilitation so that you can -- there is a component of rehabilitation that is required under the cutting permit for landings and there is a requirement in every interior forest region that some form of rehabilitation be undertaken with regards to either erosion or productivity depending upon the capability and objectives of the block.

Q. What do you mean rehabilitation in

relation to productivity? I can understand erosion. What do you mean by rehabilitation in relation to productivity?

A. If you would go to back to the guide under Tab 7, and I believe it would be pages 18 and 19, it discusses the requirement for landing rehabilitation.

There are two pieces here. There are what we call partial landing rehabilitation and that is when the restoration of productivity is not feasible. You cannot effectively bring the topsoil back on.

Then there is a section called -- well, the first one is full rehabilitation. I'm sorry, I reversed them. There is partial rehabilitation. This is when some soils are not -- some soils are just not amenable to rehabilitation and those soils that are identified that are, such as there are some -- if you look at the top of page 19, suitable landings are located on good, medium size -- the soils are conclusive to tillage.

Those type of soils that have a high opportunity for volume recovery are done from a full rehabilitation procedure. Those that are not conducive to some form of effective -- cost effective control, they are rehabilitated specifically with regards to

erosion and some type of forage cover for wildlife.

Q. All right. So the full rehabilitation is generally in those areas where you think you can maintain or bring it back into production?

A. Right.

A. But this is one of these interim matters which has not been formalized as a rehabilitation requirement; is that correct?

A. No, this is just a reiteration to help them in the planning out. When we were discussing this to our workshop, landing rehabilitation is a requirement of the cutting permits.

Q. All right.

A. And these are the two levels at which it is done.

Q. So in the cutting permits in terms of rehabilitating landings there is a -- it distinguishes between full and partial and the decision as to whether you go full or partial is based on the kinds of considerations you have set out here in Tab No. 7? Is that what I understand you to say?

A. That's right.

Q. That's in the cut permit?

A. Yes.

Q. Now, that is, I take it, the extent of the rehabilitation requirements in the cut permit; is that correct?

A. There is also a requirement for the establishment of water bars or some sort type of drain break when you have constructed skid roads.

Q. Okay. Anything else in terms of rehabilitation?

A. At the present time there is not.

Q. Okay. Now, there is a reference on page 21 of this same tab to skid road rehabilitation. That is something which I take it is not included in the cut permit, but is something which is proposed in this particular document and which may, in fact, be approved in this form?

A. Yes, it is.

Q. Is that correct?

A. Yes.

Q. These roads and landings, let's deal with landings first. When a landing is constructed in British Columbia, what effect does it have on the calculation of your annual allowable cut?

Is it ever taken out of the land base for the purposes of calculating the cut which is allowed for the next period?

A. That policy has decided on more of a region by region or TSA basis. The Kamloops Forest region, I believe Prince George, some of the TSAs in the Caribou, they do make an allowance, a net down, I believe, of one to two per cent of the productive land base and they assume that to be a dedication to the harvesting operation.

Q. Okay. Is that something which is done voluntarily or is that requirement; do you know?

A. That is a built-in factor and all that goes in to make those calculations. So it is done by the timber branch.

Q. What about primary roads?

A. There is also an -- primary roads, at the present time there is a road landing figure, then they just have one number and that can vary from region to region.

Q. And that's the one to two per cent you are talking about?

A. In some regions, yes. That seems to be the dominant, although I know that in the Merrit TSA that number is being adjusted up based on the survey data that they have recently accumulated.

Q. And within that road calculation, are they including skid roads or are we talking now primary

and second roads?

A. Skid roads are not included at this time in that calculation.

Q. I take it then skid trails are not either?

A. No, they are not.

Q. Thank you. I am on my last set of papers here, Dr. Carr.

A. Promise.

Q. Yes. You gave some evidence about the amount of literature that didn't exist about compaction in Ontario and eastern Canada.

Were you suggesting that the absence of literature on this subject in some way indicated that the forest managers in Ontario didn't care about compaction and had not even thought about it? Were you trying to leave that suggestion?

A. No, I wasn't.

Q. Okay. Would you agree, sir, that the absence of literature on the issue of compaction and erosion and these other site degradation processes that you referred to in Ontario might very well be the result of professionals familiar with conditions and operations in this part of the country have concluded that it is not a problem worthy of scientific papers,

that it is not necessary to deal with it in the kind of manner that it has been addressed in, say, British Columbia?

A. Would you bring that down to a more concise question, please.

Q. Is it a plausible reason for lack of literature in relation to soil degradation processes in Ontario the result of a decision made by forest managers that conditions here do not warrant the subject matter being given any sort of priority?

A. The level of literature could well reflect the decisions -- the managers' decisions that they do not feel it is an issue.

Q. Right. It may be that they have decided that it is not an issue or it shouldn't be given any priority not because it is completely absent, but because it occurs to such a small degree that it is not something which needs to be addressed?

A. I really have no indication of what the decision-making process is, which direction it is.

Q. All right, thank you.

MADAM CHAIR: Mr. Freidin, was your question referring only to soil compaction?

MADAM CHAIR: No, I said soil degradation processes as described.

Q. You made reference to the British Columbia approach being considered in Alberta and you have made reference to what is going on in Oregon and Washington, I guess your reference to the United States Forest Service approach in region No. 6.

Are you able to confirm, sir, that there is no national methodology for assessing long-term risks to sites in the United States Forest Service?

A. I know of no national methodology.

Q. All right. Can you confirm for me that there are no national standards or guidelines in relation to that subject matter in the United States Forest Service?

A. There is a guideline that is national with regards to soil density.

Q. Are there any national standards?

A. Yes, there is.

Q. Could you advise me where we would find those?

A. A publication called Guidelines for Sampling Some Physical Conditions of Surface Soils.

Q. That's the document that mentioned sampling. I want to know whether there is a standard?

A. The standard is mentioned in here as to why they have the procedures.

Q. All right.

A. For reference this is by Steve Howes, John Hazard, J. Michael Guist. The number given to it by the publication of the Forest Service is R6-4WM-1461983.

MADAM CHAIR: Mr. Freidin, was your question about the national methodology about soil degradation generally or about soil erosion?

MR. FREIDIN: I said for assessing long-term risks to sites.

THE WITNESS: The only one that I know has a national definition --

MR. FREIDIN: Q. By the way -- all right. I'm sorry, go ahead.

A. With regard to compaction, there is a definition that compaction is a process in which bulk density is increased and macro porosity is decreased, is the result of increased loads and/or vibration of the soil.

"Detrimental compaction has been defined as more than a 15 per cent increase in bulk density or more than a 50 per cent reduction in macro pore space or 15 per cent or less macro pore space."

Q. I think what you have read to me is a

definition of what compaction is or detrimental compaction is. What was it, the definition of what, sorry?

A. That was the definition of detrimental compaction.

Q. All right. Can you tell me whether in fact -- although that may be a definition, Dr. Carr, what I am really interested in knowing is, has there been a standard, a national standard set that says - somewhat like in British Columbia - you shall not have detrimental compaction over "x" amount? That's what I meant by standard.

A. I do not know if there is a -- I don't think there is a national standard, that those types of measures are generally set on a regional basis.

Q. All right. The one region that we have heard about and is referred to specifically in your witness statement is region No. 6 which is the Pacific northwest. I understand that there is a standard of some sort there; is that correct?

A. Yes, there is.

Q. Thank you. Is the Pacific northwest the -- sorry.

A couple of miscellaneous matter. You

made a comment during your evidence, Dr. Carr, you were talking about the United States Department of Agriculture and you were talking about some information that they devised for soils or predicting what will happen with soils and you said sometimes that's used or stretched to serve forestry purposes.

Do you remember the evidence?

A. Yes, I do.

Q. What were you talking about being stretched from sort of the agricultural setting in order to serve forestry purposes?

A. In addressing that statement there has been a lot of push and effort to develop predictive models for determining the amount of soil erosion to be expected off an area of forest development.

Most of the models that have been currently used are based upon some version of the modified universal soil loss equation which was developed under agricultural conditions.

There has been some testing to the various modifications to extend into areas of steeper slopes, there has been a major effort out of Utah that looked at applying the universal soil loss equation or prediction in regards to road construction and this is sort of the driving force behind many of the models

that currently exist.

Q. You said, though, that sometimes you think that they are -- these agriculatural models are stretched to serve forestry purposes.

I got the impression that you felt there was something perhaps unwise or improper about using agricultural models and attempting to apply them at least to some forestry subject matters. Did I understand you correctly?

A. In reviewing the systems and the predicted effectiveness when they went out to verify the validity testing --

Q. This is the validity of the agricultural model?

A. Well, the agricultural model is the basis. There have been often a number of manipulations to make it more suitable for forest land. It is no really longer the agricultural model. It has become a modified version of it adapted to forest land.

The absolute predictive capability in terms of the amount of sediment delivered, the correlation has generally been relatively poor with regards to a scientific quantitative assessment. These models do still have a role because they have to be the best that you have.

Q. Can you just in a nutshell tell me why the agricultural models have to be modified for them to be applied to forest conditions?

We are talking here about your area of soils or I guess soil degrading process.

A. You are talking specifically about soil erosion and the modification that has to be made is with regards to the steepness. The original universal soil loss equation dealt with agricultural fields of very, very low slope. I believe the maximum was 9 per cent.

Q. What about the fact that agricultural soils are exposed mineral soil, whereas forests generally have vegetation on forest floors?

Is that something else that has to be taken into account in modifying?

A. You take into consideration the amount of mineral soil expected to be exposed by the operation and that is sort of segmented along.

Q. Thank you. In your evidence you were giving some history of what led up to this approach in British Columbia that you have talked about, the sensitivity, hazard ratings, et cetera, and you talked about disagreements ongoing between the people responsible for doing the harvesting on the one hand

and the people responsible for doing the regeneration, that they would sort of never -- they would be arguing all the time because the people who were responsible to plan the regeneration were saying to the people who were planning the harvest: You guys doing the harvest are going to make it impossible for me, you are screwing things up in terms of my ability to regenerate and the loggers would say: No, we are just doing fine.

Is that sort of what was going on back in the early 80s?

A. In a general sense that is the type of problem.

Q. I also took it from your evidence, Doctor, that this division of responsibility for the harvest plan and the silvicultural or regeneration kind of plan is still a subject matter which is dealt with by two different departments within the Ministry of Forests in British Columbia; is that right?

A. In developing the plan, it is an integrated team approach. The jurisdictional components are slightly different, but with regards to developing a timber harvesting plan one single professional forester will sign the document that has been prepared properly and that all these issues have been addressed. It comes under the responsibility of

one forester.

Q. And although it comes under the responsibility of one forester, when it is implemented is it implemented by two different sections of the ministry?

A. The ministry only has an administrative role. I mean, they do not conduct the plan. The plan is generally conducted by the forest company or the licensee.

Q. What role does the forest company have in preparing this plan in terms of the harvest plan and the silvicultural plan in British Columbia?

A. It depends on the type of licence. There are a number of tenure systems within British Columbia ranging from a tree farm licence where the company has the entire responsibility for the management of the area, all aspects, to various types of cutting -- you know, licence just to cut, on the smaller licence to cut - the Ministry is responsible for the management on the larger licences - the company forester is responsible.

MR. FREIDIN: It might be a good time for a break, Madam Chair. Those are my questions of this witness.

MADAM CHAIR: Thank you very much, Mr.

Freidin.

You will have time to prepare your re-examination over the break, Mr. O'Leary.

MR. O'LEARY: I will, Madam Chair. I can believe safely say we will be done pretty close to on time.

MADAM CHAIR: Good. Thank you.

---Recess at 2:40 p.m.

---On resuming at 3:05 p.m.

MADAM CHAIR: Please be seated.

Mr. O'Leary?

MR. O'LEARY: Thank you, Madam Chair.

RE-DIRECT EXAMINATION BY MR. O'LEARY:

Q. Dr. Carr, Mr. Freidin started off with his cross-examination, and I presume because it was the first point it had to be one of the most important ones, he went to your CV and asked you a number of questions and one of which was in respect of the fact that you are not a registered forester.

Can I ask you, what sort of students, if we can call them that, come to attend your workshops in British Columbia?

A. Over the 26 workshops that have been given throughout the province and, we do take this workshop around - we have actually created like a

concert tour T shirt to go with it with dates - we have had only 700 students who ranged anywhere from people with Masters and Ph.Ds, professional foresters, technicians and all the way down to Cat driver level, as well as we've had several members of the general public attend to try to understand more about the process of timber harvesting and site degradation.

Q. Has there ever been any concern expressed that you are teaching registered foresters about the areas of your specialty and yet you don't have the piece of paper to hang on the wall as yet?

A. That has never been put forward at all.

Q. Can you tell me, who are you usually retained by to give these workshops?

MR. FREIDIN: Well, Madam Chair, we went through his qualifications and we talked about the workshops and all the work.

This is just repeating his qualifications again. I think he has clarified the point about the RPF and maybe the significance of that, but I think we are starting to repeat the evidence-in-chief.

MR. O'LEARY: That was going to be my last question. Mr. Freidin started to question this witness about the quality of his expertise given the

fact that he wasn't a registered forester.

He has now given evidence that he is the one who teaches the forester and I suspect his next response would be some level of government in B.C. is the one that retains him, but I can move on.

Q. Is that correct, it is the Ministry --

MR. FREIDIN: Well...

MR. O'LEARY: All right.

Q. Can you respond to that question?

MR. FREIDIN: Madam Chair, I still think it is improper. I will save my objections and my argument for something more substantial. Go ahead.

THE WITNESS: It is the Ministry of Forests that provides for the contract to implement the program.

MR. O'LEARY: Q. All right, thank you. Next we are going to go to our atlas of the world which was marked in part as an exhibit and as I have often found can be the case in cross-examinations, you learn as much from what is presented as you do from what isn't presented and what I would like to bring --

MR. FREIDIN: Madam Chair, I would ask that Mr. O'Leary not editorialize and comment, but just ask the witness questions.

MR. O'LEARY: So noted.

MR. FREIDIN: We are one for one, Mr. O'Leary. You have one and I have one.

MR. O'LEARY: Perhaps we do need a blackboard.

Q. I am going to show you page 24 and 25 - and I would ask this be marked as an exhibit, Madam Chair - and this is a two-page depiction topographically of British Columbia, the southern portion.

MADAM CHAIR: Which exhibit number did we assign originally to the Phillip's Atlas of Canada and the World?

MR. O'LEARY: 2053A is the exhibit of western Canada taken out of that atlas and now I am asking that a two-page topographical depiction of the southern portion of B.C. be included as an exhibit. I think we reached D.

MADAM CHAIR: We can make this 2053C and this will be excerpts of pages 24 and 25.

MR. O'LEARY: We will get some copies and hand them around.

MADAM CHAIR: Thank you, Mr. O'Leary.

---EXHIBIT NO. 2053C: Pages 24 and 25 from Phillip's Atlas of Canada and the World.

MR. O'LEARY: Q. Can-you tell me, Dr. Carr --

MR. FREIDIN: Do you have copies?

MR. O'LEARY: We are going to get them.

Q. Can you tell me, Dr. Carr, is there any portion of the geographic area that's represented in that exhibit the area where you have conducted many of your field studies and upon which you are giving evidence in relation to site degradation in British Columbia?

A. Yes, there are.

Q. Can you point out to that area on this exhibit where you are referring to?

A. There are several areas where I currently have researched and also have been given workshops.

Much of the activity has been out of Prince George out towards what is called Tsacha Lake. This was actually the location of the areas that were the topic of FRDA Report 03, worked down through -- out of Red rock, probably about 15 kilometres from the highway, worked out of Williams Lake towards Horsefly.

Q. I don't know want to prolong --

A. I mean, all sort of several topics all through this centre down toward Kamloops.

Q. All right. Much of the area you just referred to - Mr. Freidin, you can correct me if I am wrong - is depicted in a yellow colour?

A. Definite portions, yes.

Q. And topographically for the record can you tell us what range we are talking about there?

A. Between 400 and a 1,000 metres.

Q. All right, thank you. Is there a name that's given to that region of British Columbia?

A. That is part of what is considered the interior plateau.

Q. In relation to what we see in the east of it and to the west of it, all these mumble jumble, can you describe what the interior consists of and what those other regions are?

What is this topographically to the east and west of the interior plateau as depicted in --

A. There are mountains on both sides.

Q. All right. And the interior is?

A. A large portion of the interior are large flat plateaus.

Q. Thank you. Dr. Carr, you were given a number of pages taken out of Rowe's Forest Regions of Canada and those are Exhibit 2052A through to 2052D. I I don't want you to go through them, I just want to

refresh your memory as to what they are.

There is the Foreward, there's a major physiographic region map, there is a major soil zones and regions description page and another map, Canada Major Soil Zones and Regions. Do you remember those?

A. I have them in my hand.

Q. What, if any, assistance would these be to you in determining the sensitivity of a site for degrad -- the sensitivity of a site in terms of potential site degradation?

A. Absolutely none.

Q. In your experiences in the British Columbia interior, did you ever find yourself involved in any flat terrain at any time?

A. The vast majority of my research work with regards to this issue has been on flat terrain.

Q. Would any of these -- can you describe for us what you mean by flat terrain?

MR. FREIDIN: Well, Madam Chair, I asked him specifically whether the area that he referred to was gentle and rolling was the area which was less...

MADAM CHAIR: 30 per cent slope.

MR. FREIDIN: Had a slope that was less than 30 per cent. He had the opportunity to indicate whether it was 5 per cent or 2 per cent. I don't

think - we are now introducing a new term called flat - we should start getting into that. He gave his evidence on this.

MR. O'LEARY: I didn't ask that. That would be a leading question and I wouldn't do that Mr. Freidin, but I am trying to clarify from the question that was put -- you are the one that brought up this concept of the type of terrain.

I am simply asking a simple question. How would you describe that portion of British Columbia where his evidence has predominantly been from. It is a clarification on your question, Mr. Freidin.

MADAM CHAIR: The evidence we have from Dr. Carr is that these areas are gentle, rolling lands.

THE WITNESS: Gentle rolling lands on a block basis, on a cut block where a lot of the work -- the scale that I have operated on would be considered I would think fairly flat or gently rolling.

MR. O'LEARY: All right, thank you.

Q. Can you translate that into per cent terms in terms of the slope, if any, or a range?

A. I have worked on areas with 5 per cent slope and localized areas obviously flatter and sometimes times steeper.

Q. All right. Do you find any evidence

of site degradation in any of these areas?

A. Yes, there is evidence of site degradation in these flat and rolling type terrain.

Q. Are any of these site degradations those listed in the evidence that you have put before the Board, the four classes you referred to?

A. Yes, they are, although for the most part we're generally dealing with soil erosion and soil compaction. Occasionally soil displacement if there is what we term an unfavorable subsoil that once exposed will have regeneration problems.

Q. Thank you. Dr. Carr, can you tell me, does the forest type have any impact on the potential for site degradation?

You will recall that Dr. Carr spent -- my apologies. I will call you Dr. Rowe in a second.

Can you tell me, you will recall that Mr. Freidin spent a good deal of time discussing the boreal forest and my question simply is, does the forest type have any impact on the potential for site degradation?

A. The forest type could have some impact, although the majority of the impact is related more specifically to the soils and the terrain, not the type of timber that's specifically on that.

Q. All right.

A. As I look at the keys that you have produced in evidence here, there isn't any reference to tree types. I was wondering if you could explain why that is?

A. We are dealing in those keys specifically with aspects of soil degradation and have concentrated that -- our efforts in dealing with various types of soils, textures and slopes irregardless of the type of tree or forest system that is associated with them.

Q. Thank you. Turning to those keys, and I don't propose to take you through it, I just want to ask you a question generally about them and I am looking at the keys at Tab 7 and 8 of the witness statement.

Can you tell me, what portion of B.C. are these keys intended for? Where would these operate?

MR. FREIDIN: Well, Madam Chair, he led all the evidence about these keys and how important they were and that was his opportunity to talk about this sort of matter.

It is a new issue. It wasn't something that came up for the first time in cross-examination. This witness may give an answer I may not be happy with and, more importantly, my client may not think it is

correct and I have no opportunity to cross-examine.

We are splitting the case. We are dealing with the same subject matters; i.e., what these keys are all about, how they are used, where they are used, why they are used, all dealt with and raised in his evidence-in-chief. He has got an obligation to lead all his evidence on that at that time so I can cross-examine on it. He is splitting his case. That's the rule on re-examination. I think it is improper.

MR. O'LEARY: Madam Chair, I stood up after my friend mischaracterized the evidence at that point. You will recall that I stood up and said that that was inappropriate and it is that very point I am addressing here.

He has suggested to this witness that the appropriate comparison is between the entirety of British Columbia and that of Ontario or the undertaking in this case. I am simply trying to clarify for the record exactly what these keys are intended for.

MR. FREIDIN: Madam Chair, if he wants to ask him why he thought the scale at which I was putting the maps to him was improper that's a valid question. Let the witness answer it, but don't take him through the key and start leading him along and building the case for the answer.

MR. O'LEARY: It is the only question I have about the keys, Madam Chair.

MADAM CHAIR: Mr. Freidin, the Board understands your objection and we won't let Mr. O'Leary split his case. We will give him a minute to put this question to the witness and so far as we are concerned we have Dr. Carr's evidence on this matter and we expect that this will be repetitive, but put your question to him quickly, Mr. O'Leary.

MR. O'LEARY: Q. That was the question, Dr. Carr. Simply, where were the keys identified under Tab 7 and 8 intended to operate in British Columbia?

A. They are applicable to the entire interior of British Columbia.

Q. All right.

Q. My next question arises out of a quotation that Mr. Freidin drew your attention to in key No. 7 and he read to you --

MR. FREIDIN: Tab No. 7?

MR. O'LEARY: Tab No. 7 of the witness statement.

MR. FREIDIN: What page?

MR. O'LEARY: Page 12.

Q. He read to you the first sentence and you did not get into the second sentence. I simply

want to inquire whether or not you feel it is helpful in terms of your response to clarify matters to also read the second sentence of the same paragraph. I will read the first sentence.

MR. FREIDIN: Wait a minute. Which paragraph?

MR. O'LEARY: Very first paragraph, I am going to identify it, under Low Degradation Sensitivity.

Mr. Freidin, what you read to him was: "Sites that have low degradation and sensitivity, low mass wasting and displacement hazards and low or moderate surface erosion and compaction hazards." That's what you read to him. What didn't come up was--

MR. FREIDIN: Well, wait a minute.

MR. O'LEARY: --these sites.

MR. FREIDIN: Excuse me. Excuse me, Madam Chair. If he wants to clarify the answer that the witness gave to the question I asked him and refer the witness to the answer he gave and ask for clarification, it is improper to led him to some other section and say: Is this helpful and maybe he will go to another document and say: Does that help too.

MADAM CHAIR: This isn't another section.

MR. FREIDIN: It doesn't matter. It doesn't matter if it is a different section, Madam Chair. He can ask him to clarify the answer which is given. He can't start taking him to other parts of the document.

MR. O'LEARY: I'm not. I am taking him to the part -- and you only read - in fact Mr. Hanna just corrected me - you only read half of the second sentence. You read:

"These sites tend to be on gentle moderate slopes."

You didn't read the last three words, "with deep soils" and I am entitled to put to this witness, whether it is in the transcripts from someone else or any other document, the balance of the sentence.

Q. I am simply asking, Dr. Carr, is there any significance to the reference to "with deep soils" in the context of that paragraph?

A. I can't see anything additional at this time that that would deal.

Q. All right. If there was an absence of deep soils, would it still fall under the low degradation sensitivity?

MR. FREIDIN: Madam Chair, now we are talking about depth of soils and what does that do for sensitivity hazard ratings. I can't cross-examine on this evidence. It is absolutely new stuff.

MADAM CHAIR: Your witness has said that it doesn't have any bearing on his previous response, Mr. O'Leary.

MR. O'LEARY: Thank you, Madam Chair. I will move on.

Q. Dr. Carr, Mr. Freidin asked you a number of questions about the absence of analysis or documentation in the Province of Ontario dealing with site degradation.

Can I ask you, are you aware of any documentary evidence dealing with Ontario other than the reference that was brought out in your evidence-in-chief that's contained in the witness statement of Mr. Greenwood which I referred to as being a comment by Mr. Arnott, are you aware of any evidence that there has been any consideration of the issue of site degradation in Ontario other than that one comment?

MR. FREIDIN: I object, Madam Chair. He was asked in evidence-in-chief as to what in fact there existed in terms of compaction and this subject matter

in Ontario and eastern Canada. He gave his evidence. He is being asked again about it. He may give a different answer. I can't cross-examine. It is improper re-examination in my respectful submission.

MADAM CHAIR: The Board accepts Mr. Freidin's objection. We have Dr. Carr's evidence on that.

MR. FREIDIN: Thank you.

MR. O'LEARY: I wasn't asking that to get a different answer. It was to set up -- just to bring it into context for the next question. The concern I have is that...

Q. My question to you is this: What in your opinion degree of confidence could you as a scientist place upon information or the analysis done to the extent that you are aware of in Ontario in coming to a conclusion about the existence or non-existence of a problem such as site degradation?

MR. FREIDIN: Madam Chair, I asked him in cross-examination whether he could make any conclusions or would suggest that there was somehow -- the matter was disregarded, wasn't looked it and he said, no, he couldn't do that.

I asked him whether in fact it could be that the reason it hadn't been looked at was because it

wasn't regarded as a matter of priority because of the conditions here and he said: Yes, that's possible.

If he wants to ask him clarification why he came to that view, that's fine, but the way he is putting the question is not a question asking for clarification of something he said.

MR. O'LEARY: It is a clarification. You asked from the perspective of an opinion of forest managers and I am asking from this gentleman as an expert, as a scientist, from the scientific perspective would the response be the same. That's a clarification.

MR. FREIDIN: With respect I don't think it is.

MADAM CHAIR: Are you completely confused, Dr. Carr, because the Board is?

You have given us two pieces of evidence. One is that you believe in Ontario we don't have enough evidence or information to know whether or not we have a soil degradation problem and, secondly, you have agreed, as Mr. Freidin has just characterized, the reasons why there might not be more in the literature in Ontario.

Do you have any clarification of that evidence?

THE WITNESS: Only that to complete that -- the fact that you don't have the evidence or they have undertaken it doesn't mean that there isn't. So it refers back.

There is nothing -- there is no data to make the decision process on. There is no specific data and the manager may -- you know, I have no idea what goes on in the planning process so I could not say if there was -- you know, that there wasn't and they didn't care or that they did.

So maybe I'm a little bit confused, but I guess it comes down to lack of data may not necessarily mean that it's a problem, but you also cannot say that it isn't until you have something fairly concrete.

MR. O'LEARY: Is that helpful?

MADAM CHAIR: We have Dr. Carr's opinion.

MR. O'LEARY: Madam Chair, I have one last question and it is along the same lines as the last one last week. It arises out of an inquiry by Mr. Martel and I made a note of it this week. Perhaps when this hearing is over -- I did recall exactly what it was after the hearing last week.

You inquired, Mr. Martel, with Dr. Carr about whether he knew anything about the differential in the rainfall between the area of the undertaking and

the interior of B.C.

Q. Could I refer you, Dr. Carr -- it's Rowe's book and specifically pages 141, 143 and 145. I have a copy for everyone. We have taken the liberty of highlighting just that portion.

Also for assistance in understanding the areas we are speaking of here, I am referring you, Dr. Carr, to Exhibits 2053A and 2053B which are the maps put in by Mr. Freidin, both of the area of the undertaking and British Columbia and I have been so presumptious as to put a couple of dots on the map representing those areas where the rainfall appears in the Rowe's forest book. Can I ask you to turn first of all, to --

MADAM CHAIR: Do you want an exhibit number for this, Mr. O'Leary?

MR. O'LEARY: Yes, please.

MADAM CHAIR: Shall we keep it under the same exhibit number, 2052, which is the Rowe's material and this will be Exhibit 2052E. This is excerpts of pages 140 to 145 of Rowe's Forest Regions of Canada.

MR. O'LEARY: That's correct. Those are the right pages.

---EXHIBIT NO. 2052E: Pages 140 to 145 of Rowe's Forest Regions of Canada.

MR. O'LEARY: Q. On page 140, if you could go down to the designation D4 and you will see the station is Iroquois Falls. If you follow your finger across you will come to the column entitled Mean Annual Precipitation. Do you see that?

A. Yes, I do.

Q. Can you tell us what is the precipitation for Iroquois Falls?

A. 33 inches.

Q. And where does Iroquois Falls roughly appear in terms of Exhibit 2053B?

A. It looks to be a bit northeast of Timmins.

Q. All right. If we look at the entry for Long Lac, will you tell us what the precipitation there is?

A. That is 30 inches.

Q. Similarly we are talking about for Dryden, what precipitation would be there?

A. 27 inches.

Q. Can you then flip over to the next page and you will see there is an entry for Peace River halfway down the page.

A. Yes.

Q. Can you tell us what the

precipitation is for that station?

A. 14 inches.

Q. And Peace River appears where on the map in 2053A?

A. Peace River is on the upper northeast corner of British Columbia.

Q. You recall the topographical name for that region?

A. That was the Great plains.

Q. Thank you. Just one or two more. Can you flip the page over, and down towards the bottom you will see there is one for Quesnel. Can you tell me what the rainfall there is?

A. That is 20 inches.

Q. Could you advise us where that appears in British Columbia in relation to Exhibit 2053A?

A. That's a little bit south of the Prince George and an area known as part of the interior plateau.

Q. One last question, Dr. Carr, and that is, now that you see these annual rainfall figures for both three stations in the area of the undertaking and two in British Columbia in which you have given evidence about, can you tell me, is there any

significance in terms of site degradation as a result of these rainfall figures?

A. I will address the two that I'm more familiar with. Particularly the one up in near -- the dots is fairly large here, the one in the Peace River country --

Q. To save time I might --

A. Soil erosion is a significant problem there. It is one of the biggest management problems that they have. In Quesnel there is a great deal of problem with soil erosion and there have been number of charges in that area with regard to timber harvesting and fisheries impact by the Department of Fisheries and Oceans.

You would have more rainfall in the areas that are identified in Ontario. So there the potential for a greater erosion problem than in the areas in British Columbia.

MR. FREIDIN: Well, you see, Madam Chair now how do I cross-examine him and talk about the frequency of the rainfall, what's the amount of soil that's exposed, what is the slope it's all on. We get this piece of evidence and I have absolutely a bald statement made about the susceptibility of soil erosion in the area of the undertaking based on some piece of

information about rain and I can't cross-examine on it.

I mean, I just have to object.

MADAM CHAIR: The Board hears your objection, Mr. Freidin.

How are we going to treat this, Mr. O'Leary?

MR. O'LEARY: Madam Chair, I respectfully submit that the question and the chart I put to Dr. Carr are perfectly in order normal under the circumstance.

It is within the Board's powers to accept evidence. It is in re-examination the circumstances are somewhat unusual in the sense that I am responding to a question put by a member of the Board.

The material is taken out of a document which has been put into evidence by my friend. I am not going back to an old document. This is an exhibit that he has put in his cross-examination and I am simply asking this witness if there is anything else that would assist him in that document in response to a question put by Mr. Martel.

We get back to the whole gist -- or at least the vast majority of the cross-examination where, Mr. Martel, I see two maps up there and we have heard all day questions of similarity between the west coast

and Ontario and it goes directly to that issue.

The unusual side of it I acknowledge, but I respectfully submit that it is evidence that should be accepted.

MR. MARTEL: I think I asked because it was one factor, Mr. O'Leary. I didn't say that it was the sum total of what might cause erosion. I think I asked very deliberately if rain could be a factor, one of the factors and that was it.

MADAM CHAIR: I think the Board has understood basically that aspects of soil degradation occurs as a result of a number of factors and we are certainly not going to - and this is for Mr. Freidin's benefit - we are certainly not going to look at mean annual precipitation levels and not look at all the other aspects we have heard in this evidence about soil degradation.

We have heard your objection, Mr. Freidin, but you will just have to rely on the Board to look at this evidence in the context of everything else we have heard from Dr. Carr.

MR. FREIDIN: Thank you.

MADAM CHAIR: Do you have anymore questions, Mr. O'Leary.

MR. O'LEARY: No, I don't. I was simply

doing to volunteer Dr. Carr for further cross-examination on the subject if that would help.

MADAM CHAIR: Do you want Dr. Carr to be -- do you have more questions for Dr. Carr, Mr. Freidin?

MR. O'LEARY: In respect to precipitation.

MADAM CHAIR: With respect to precipitation. Actually, mean annual precipitation. Five separate points.

FURTHER CROSS-EXAMINATION BY MR. FREIDIN:

MR. FREIDIN: Q. Can you just confirm for me, sir, whether in fact you can have erosion is going to be dependent not only the amount of precipitation, but whether that will occur in a situation where you have got mineral soil exposure and slope?

A. Yes.

Q. Also the number of events, rain events which give rise to the amount of precipitation, whether it all happened at once?

I think you indicated in your evidence that it would perhaps be more of a problem in terms of erosion in any given situation than if it occurred over, say, 10 events?

A. The question was at a broad scale and I did try to say that there was the potential there. There are a number of factors involved which we have gone through.

One of them is the calculation of rainfall values in association with the prediction and actually takes in the frequency, the distribution of that precipitation. There is much more than just a single parameter, but from this map if you saw different -- you know, similar levels of rainfall the potential is there. Whether or not you achieve that, it would depend upon on a wide range of factors.

MR. FREIDIN: Thank you.

MADAM CHAIR: Thank you, Mr. O'Leary.

Thank you very much, Dr. Carr. The Board appreciates all your efforts and good luck in your work in British Columbia. Thank you very much.

MR. FREIDIN: One matter of administration. The document by Morrison and Williams, Exhibit No. 2056, I have the citation for that.

Do you want me to give it so it is on the record, Madam Chair?

MADAM CHAIR: Yes, please, Mr. Freidin.

MR. FREIDIN: It is an excerpt from a report No. 86-11, Volume I, July 1986, called The

Economic Stock of Timber in the Coastal Region of British Columbia. It was prepared by the Forest Economics and Policy Analysis Project, University of British Columbia.

THE WITNESS: They are an adjunct group under the Faculty of Forestry.

MR. FREIDIN: Thank you.

MADAM CHAIR: Thank you. We will be back on Monday morning at 10:30 to hear the Coalition's Panel 4 evidence. Thank you.

---Whereupon the hearing was adjourned at 4:35 p.m., to be reconvended on Monday, January 27, 1992 commencing at 10:30 a.m.

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